Editorial Index, Page 45

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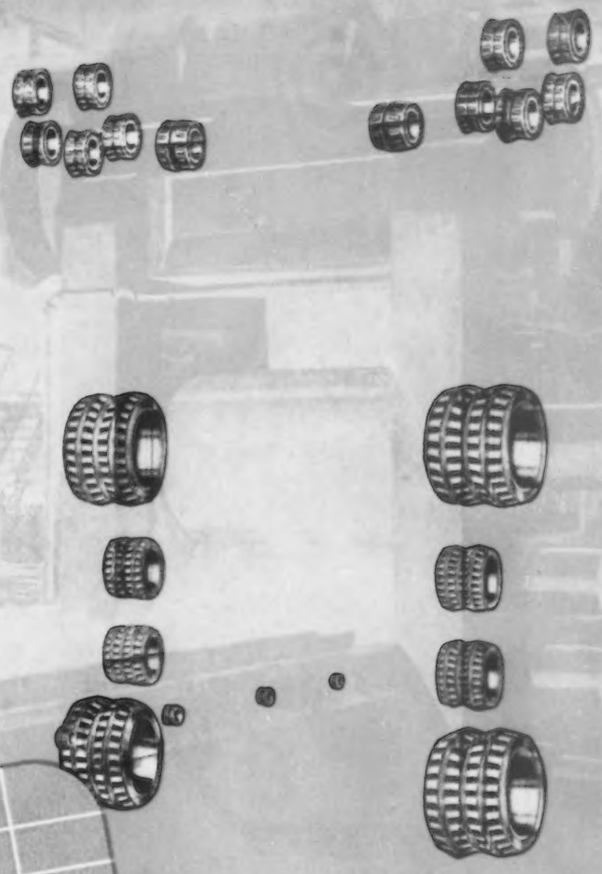
THE IRON AGE

JANUARY 10, 1946



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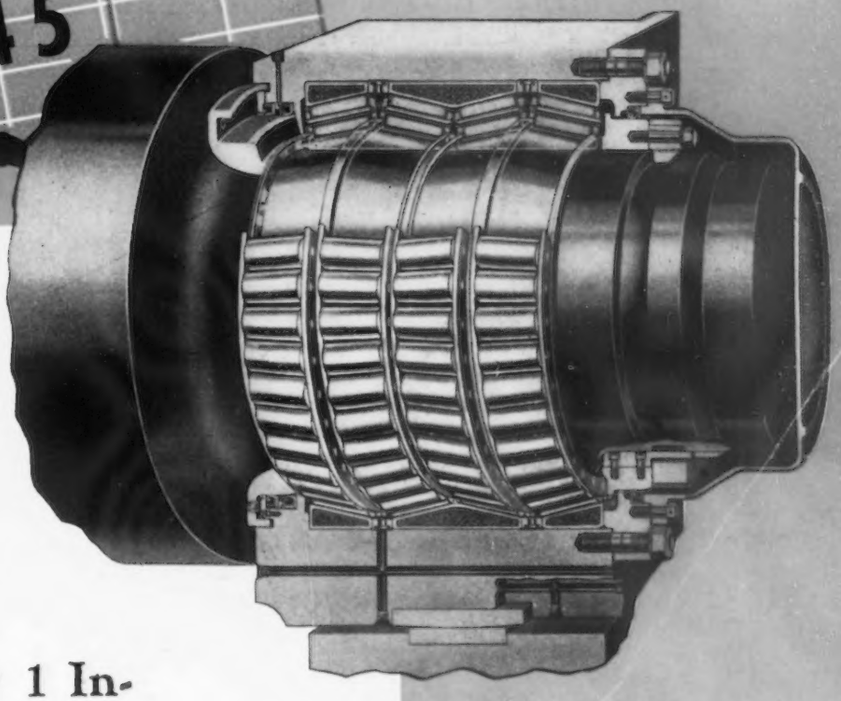

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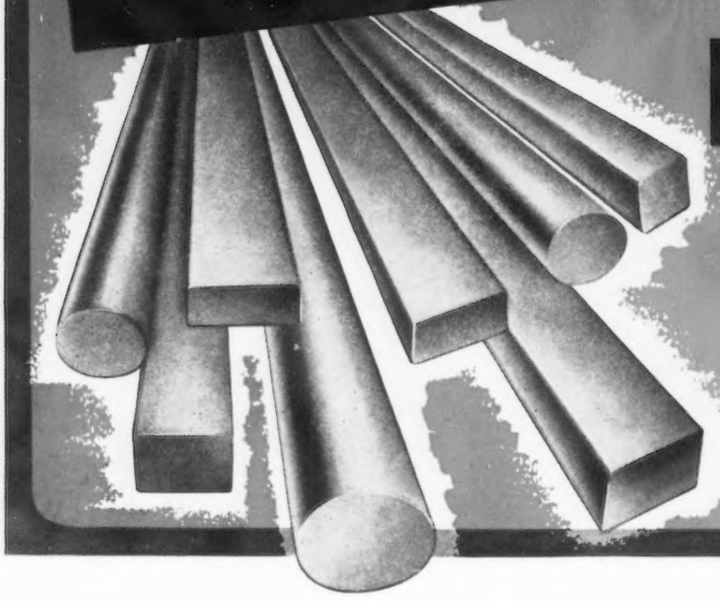

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TYPICAL APPLICATIONS

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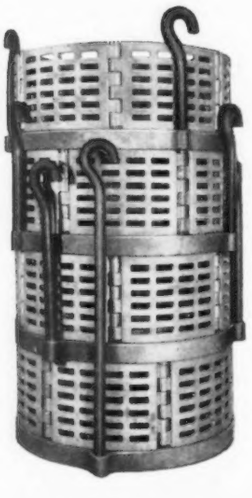

The four-basket carburizing fixture . . . having a load capacity up to five tons . . . consists of cast Alloy 502 sections held together by loose hot rolled Alloy 502 pins. Lifting hooks, that must carry this heavy load at high temperatures, are also made of Hoskins hot rolled Alloy 502.

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This Week in The
IRON AGE

Vol. 157, No. 2 January 10, 1946

Editorial

Ability to Pay ... 47

o o o

Technical Articles

Common Sense in Job Evaluation ... 50
Precision Seamless Tubing by Electrodeposition ... 54
New Method of Feeding Castings ... 59
Testing-Machine Grip Designed for Plastics ... 63
Attachments Speed Turbine Bucket Production ... 64
Single-Point Turning Research ... 66
Centerless Plunge-Grinding by Controlled Cycle ... 70
Machine Tool Lubrication ... 72
New Equipment ... 74

o o o

Features

Newsfront ... 49
Assembly Line ... 78
Washington ... 82
West Coast ... 86
European Letter ... 90
Personals and Obituaries ... 94
Dear Editor ... 98
This Industrial Week ... 100
News of Industry ... 103

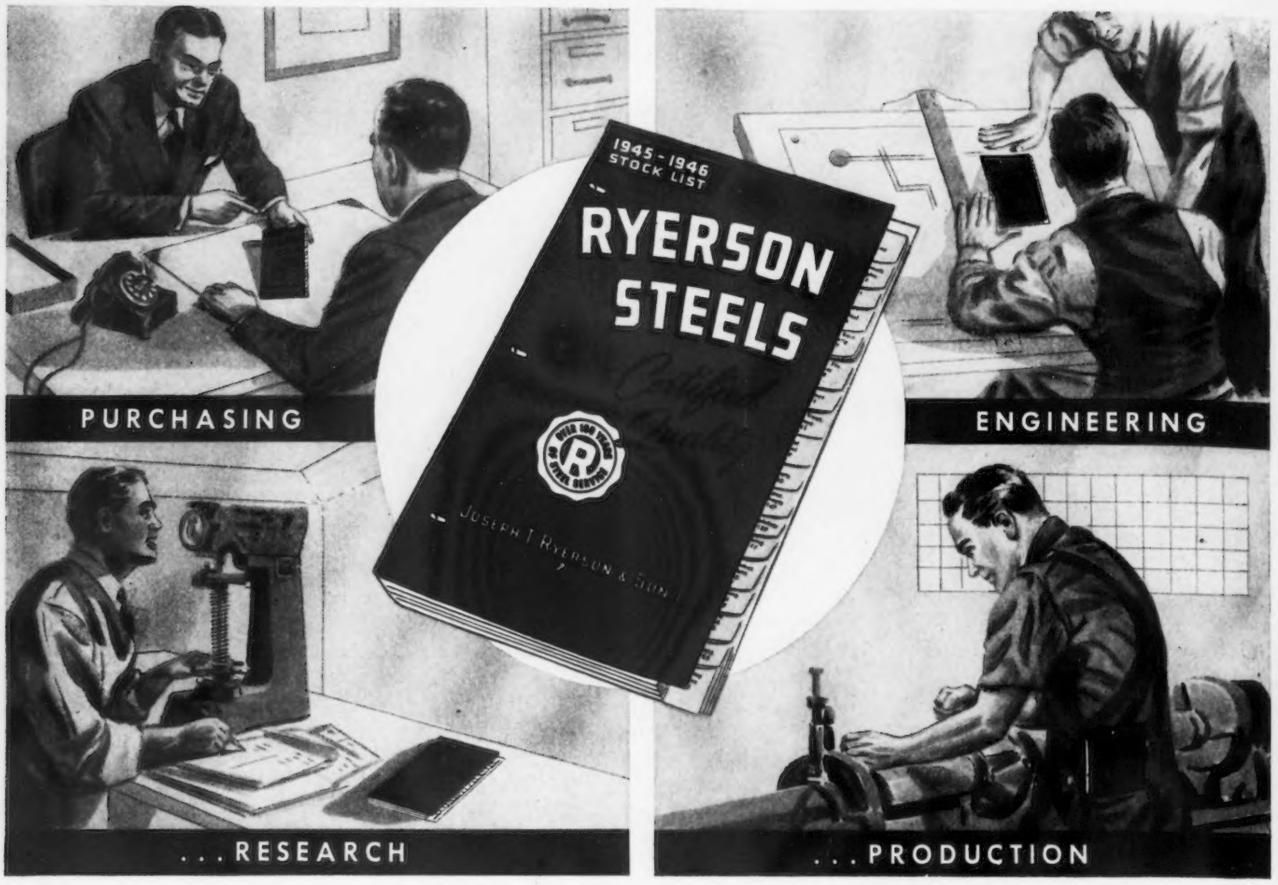
o o o

News and Markets

New Construction ... 113
Machine Tool Developments ... 114
Nonferrous Market News and Prices ... 116-7
Iron and Steel Scrap News and Prices ... 118-9
Comparison of Prices by Week and Year ... 120
Finished and Semifinished Steel Prices ... 122
Alloy Steel Prices ... 123
Fabricated Steel Products Prices ... 124
Warehouse Steel and Pig Iron Prices ... 125
Ferroalloy Prices ... 126
Dwelling Contracts Up ... 130
Canadian Firm Halts Tube Output ... 131
Canada to Depend on Exports ... 132
Construction Machinery Prices Extended ... 134
Dr. Noyes Elected ACS Head ... 135
Pig Tin Quotes Upped ... 139
Freight Car Building Strong ... 140
Engineers Consider Jet Engine ... 141
Jessop Rebuilds Bar Mills ... 142
Aluminum Postwar Outlook ... 143

o o o

Index to Advertisers ... 207-8



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The IRON AGE

ESTABLISHED 1855

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Ability to Pay

LET'S carry this new idea in establishing prices of commodities or services to its logical conclusion by transporting ourselves into a future in which, supposedly, this theory has found acceptance.

Of course, this is already established practice for individual taxation. Present plans of the President and Mr. Reuther contemplate applying it to wages. Next logical step naturally is to apply it to commodities.

Act 1: Scene 1: United States Cigar Store, corner Park Ave. and 42nd St., New York.

Millionaire, who hasn't kept abreast of the times enters and lays 17¢ on counter. "Give me a pack of Lucky's, please."

Gum Chewing Young Lady Attendant: "Not so fast, mister, lessee yer income tax statement." (Examines it, takes out volume 6, "OPA Ability to Pay Price Regulations" and unfolds 8-ft chart labeled "Price Differentials on Lucky Strike Cigarettes.")

Gum Chewing Young Lady, popping her gum: "Price to you, mister, is $17.17, according to the regulations." (Aside: "Who in heck would take this guy for a millionaire. I'll put him down as a clerk in Macy's store and slip the $17.00 into my pocket. It's an ill wind from Washington that blows nobody any good.")

Scene 2: Enter two young ladies who are employed in a nearby office building. One gets $40 per week in wages, the other $30.

Young Ladies (Simultaneously): "Gimme a pack of Chesterfields."

Gum Chewing Young Lady Attendant: "Lessee yer income tax statements." (Examines them, consults 8-ft price chart relating to Chesterfield cigarettes. Goes astray in column 16, line 84 but finally arrives at established prices in column 189, line 6.)

G.C.Y.L., popping same gum: "Price in income brackets $28 to $39 per week is 17¢ per pack. $40 to $49.75 is 19¢."

Forty per week gal, tipping the wink to her companion: "It's up to you, dearie." (Whereupon the latter buys two packs instead of one and divides them up later.)

And now, in Act Two, we turn to a domestic scene, in which not commodities but labor comes under the "ability to pay" regulation.

Act Two: Domicile of executive who had been earning (or getting) $15,000 per year but who had just been named beneficiary to a residual estate of $4,000,000 by a rich uncle.

Cook, entering dining room with first course of onion soup: "Good evening and happy new year, Mr. and Mrs. Zilch, and congratulations on your good fortune. And by the way, that brings up the question of my wages for 1946. Under the terms of our President's statement that ability to pay should determine wages, from now on, my services instead of costing you $25.00 per week will be $250.00."

(Curtain)

Every Order Must First Pass Metallurgical Control

The Inland metallurgists in charge of control are real critics and every order sent to the mill must first pass them before steel can be processed. They take one order at a time, check to see if it is similar to a previous order; if not, they examine blueprints of the part, and may even call at the customer's plant to study the method and equipment for fabrication. After they have thoroughly studied an order they designate what type of steel is to be furnished, and how it is to be processed.

Metallurgical control is another of the many methods Inland uses to assure the right quality steel for each order entered by a customer. Inland Steel Company, 38 South Dearborn Street, Chicago 3, Illinois.

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INLAND STEEL

The IRON AGE
Jan. 8, 1946

NEWSFRONT

► Dreams of a happy future in transportation have been under discussion at the sessions of the SAE meeting in Detroit where pressurized and air conditioned motor buses were foreseen, with individual radio sets, retiring room and circulating ice water, and with highway speeds up to 100 mph.

In analyzing possibilities of automobile sprung and unsprung weight per passenger, the use of aluminum alloy sheet and castings has been suggested, such as the use of formed dural bumper assemblies.

► CPA Chairman John Small has revealed that reconversion has gone into effect to the extent of 4578 CC orders issued to Nov. 23 with a valuation of $16.75 million.

In dollar values the order of precedence is wearing apparel, export and government, food, and iron and steel production, the latter with a total of $1,094,-000.

► A leading British motor car manufacturer is concentrating on a single model with a medium sized engine in order to bring down overhead costs and permit export sales. Its factory is to be laid out for production of 500 cars per day.

► One experimental car under development in Detroit is designed for the use of cast magnesium wheels.

► Experimental work on the use of polyvinylidene chloride for bristles in Germany has shown only mediocre results because of the lack of the special nickel alloys required for the machinery used in its fabrication.

► Polyvinyl alcohol motor belts with tensile strength of 30,000 psi and elongation of 37.5 pct have been found satisfactory in Germany for plants operating on an 8 hr day. Made with 25 parts triethylene glycol per 100 parts of polyvinyl alcohol, they contain 26 pct phosphoric acid.

To form an endless belt the two ends are skived off, a mixture of 10 pct polyvinyl alcohol and 10 pct hydrochloric acid in water is applied and the ends clamped together, without heating, for 15 min.

► British coal industry nationalization contemplates a tribunal to establish the value of its assets, a 9-man board to acquire the mines and manage the industry, supervision of the board by the Minister of Fuel and Power and the establishment of domestic and industrial consumers' councils to advise the Minister.

► Sound castings with high yields can be cast statically by the application of pressures greater than that of centrifugal casting. This process, developed in England, utilizes gas pressure heads and an exothermic reaction to create sufficient heat to compensate conduction and radiation losses.

► Seamless tubing with highly accurate internal surfaces are being fabricated by U. S. Rubber utilizing its Ekko process of electroforming iron.

This process consists primarily of plating on a matrix or mandrel covered with a parting compound. The electroformed part is the sleeve of desired thickness.

► Army Air Force expenditures during the war through the Air Technical Service Command totaled $36 billion, based on procurement reaching $5 billion per month immediately after Pearl Harbor.

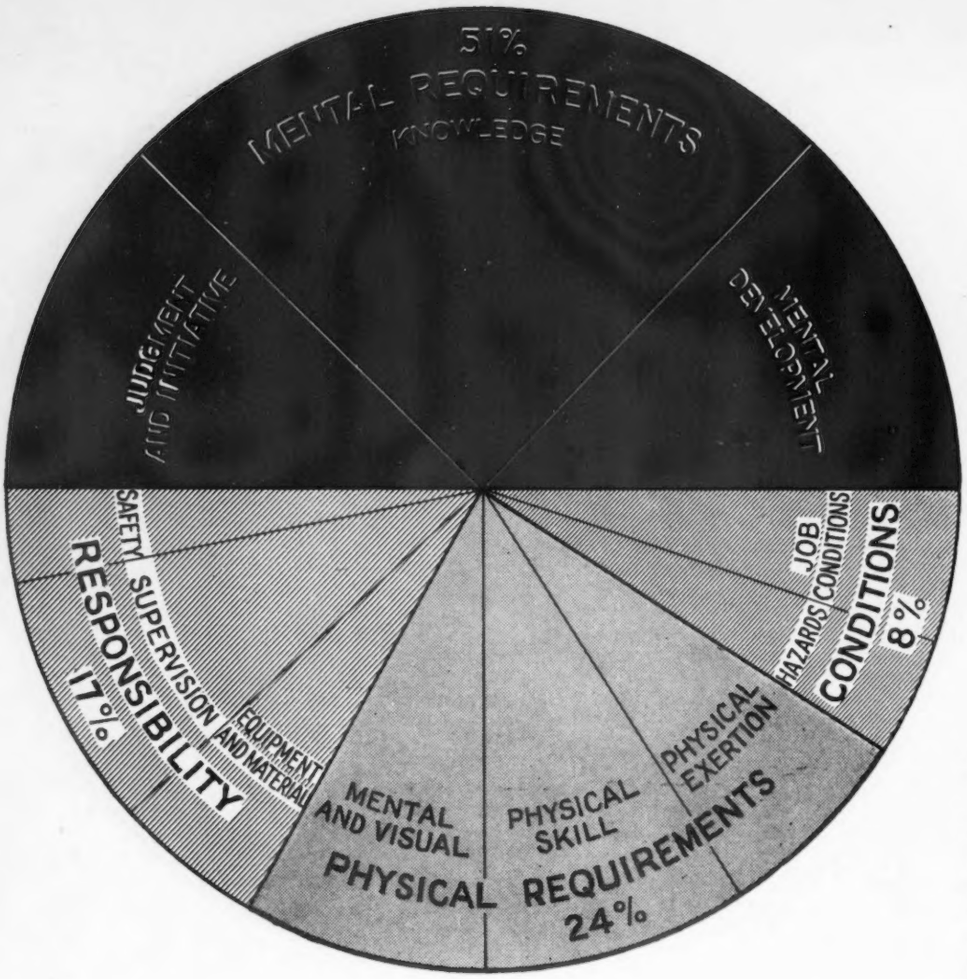
► Details of a new type of heat treatable Stainless Steel containing Titanium have now been revealed. With composition similar in general to 18 - 8, it is so balanced as to assure completion of Martensitic transformation without cold working.

► An exhaustive study of the aluminum postwar market estimates that annual demand may reach 1.5 billion lb within 5 yr at 15c per lb, at 10c per lb, it is estimated on the basis of the survey that demand might grow to 2 billion lb.

► For the first time since the war began, OPA has granted price increases on Lake Superior ores. The agency found that current profits were abnormally concentrated in only one producer.

► CPA is apparently more optimistic about the short term position of tin supply than recently, judged by its increased pig tin quotas for the first quarter out of a pig tin stockpile of 20,000 tons.

► Steel men believe that a strike is inevitable unless the president steps into the picture, and this is believed to be unlikely until the strike gets under way.



Common

By DAVID ANDERSON
and
ARTHUR H. HANSEN
Chief Industrial Engineer and Director of Standards respectively, Bulova Watch Co., Woodside, N. Y.

The purpose of job evaluation is to provide a systematic and factual basis for establishing job values that will correctly reflect the relative requirements of each job, as well as provide a means by which the company can confidently justify all wage differentials to its employees.

ONE of the most perplexing questions with which management is frequently confronted in its labor relations is, "How much is this job worth?"

At one time the answer to this question might have been a fairly obvious one. Today, however, it is not quite so simple, and a wrong or inequitable answer is fraught with many dangers to management—frequently far out of proportion to the importance of the individual job under discussion.

This is due largely to the fact that the development of large-scale manufacture has resulted in bringing together large numbers of workers of varied skill and backgrounds. These workers are often required to perform numerous services covering a wide range of demands and of values. It is of paramount importance, therefore, that if inequalities and grievances are to be avoided, and if management is to be able to attract the types of personnel required by it, then some systematic and uniform method for determining the relative value of all jobs in the plants must be established. This is the basis of all sound labor policy, for if the employees are to be convinced of the soundness of wage classifications, as well as of wage differentials, then it is vital that compensation be in proportion to the value of the service rendered.

Previous articles on time study by the same authors that appeared in THE IRON AGE *are:*

"Right and Wrong of Time Study Computation," Aug. 17, 1944, *p.* 60.

"Method of Simplification Applied to Time Study," Sept. 28, 1944, *p.* 40.

"Your Incentive Will Work If Properly Planned," Oct. 19, 1944, *p.* 55.

Job evaluation is concerned with the actual requirements of the job itself—not with the degree to which any individual employee meets or exceeds those requirements.

Although its primary and basic objective is to determine the relative position of all jobs on a yardstick of job values, a job evaluation once completed, will provide valuable management tools that will be useful in many aspects of its labor relations and production organization. For example:

(1) By providing a complete and accurate description of each job in the factory, it can be an important aid in a program of job simplification and aid in a program of job simplification and job job standardization for the entire factory.

(2) Since job evaluation provides a detailed description of every job studied, typewritten copies of every job description may be distributed to the foremen to assist them in training new personnel. Giving a new employee a clear and concise description of the work that is to be performed can provide considerable help in shortening the learning period through guiding the training program and reducing errors while learning.

(3) By determining the specific employee specifications for each job in the plant, it can be of invaluable assistance to the personnel department in the selective hiring of personnel.

(4) Through the accurate grading of all jobs, it provides a basis for an orderly and progressive system of upgrading and promotion.

The plan of job evaluation described here is based upon the weighted point method and is adapted spe-

Sense in Job Evaluation ◆ ◆ ◆

cifically for the particular job conditions that are prevalent in high precision metal parts manufacture, where considerations of high quality performance are of paramount importance.

All work, regardless of its particular specifications, calls for the possession by the employee performing it of a number of basic attributes. Although any individual job under consideration may have characteristics which seem to make it entirely different from most other jobs, it nevertheless can frequently be performed by many employees who have similar basic qualifications. This does not mean, of course, that the personnel on any particular job need be interchangeable with the personnel on other jobs. It does mean, however, that many jobs, while distinctly different from other jobs in the factory, often require the same basic attributes and types and degrees of employee exertion. It is this fact which makes it possible to create a systematic plan of job evaluation.

In attempting to establish an orderly and uniform system of job measurement that will indicate the relative value of all jobs in terms of each other, what is actually being done is a classification of the types and degrees of demand that each job makes upon those employees assigned to it. Some jobs call for highly developed and complex physical skills. Others may call for complex technical knowledge and a high degree of mental development and academic training. Still others call for the application of acquired dexterities to repetitive work. Thus while many jobs make their demands on the employee primarily through the requirement for mental and visual concentration, others are comprised principally of the need for special skills or great physical exertion. Whatever the job, however, they all have in common the utilization to varying degrees and in different combinations of a number of basic human attributes. These attributes are easily definable and the extent to which they are required are measurable once a job has been analyzed and separated into its component parts.

It is generally agreed that the demands that all jobs make upon employees can be logically divided into three fundamental groups:

(1) Those demands which require such basic individual characteristics as mental development and technical or academic training.

(2) Those demands which call for various types and degrees of physical and mental exertion.

(3) Those demands which are placed upon an employee as a result of the physical conditions under which the work is accomplished, and which subject the employee to personal hazards.

The above requirements, which are almost invariably present to some degree on all jobs, can occur in many different forms, and in almost any number of separate combinations. In order to make possible an accurate evaluation and measurement of each of these basic job demands, it is necessary to divide further these basic job demands into their own fundamental components. This further subdivision is essential to accurate rating and analysis by virtue of three facts.

. . . A system of job evaluation must in order to justify its use be equally applicable to all employees from the unskilled to the highest trained. In this three-part article, such a plan which has been successfully used in a plant manufacturing high quality precision parts is fully described. In this first part, the 11 specific job factors that constitute the main sources of value for each job are defined. In subsequent issues how these factors are weighted and how point values are converted to dollar values are described.

○ ○ ○

First, each of the attributes called for from the employee has a distinct and different value as compared to all other attributes. In order to be able to properly place an individual value upon it, each attribute required in a job must be separated from all others, and be examined and evaluated separately. Second, because each of these factors include so many varied elements which are frequently present in a job in so many different combinations, it would be extremely difficult to evaluate any such large groupings as a whole. Finally, in order to be able to compare directly the attributes and exertions called for in different jobs, it is necessary that each of the factors to be measured be comprised of elements which are closely related and homogeneous.

Analysis Must Be Specific

For example, in comparing the factor of the exertion which is required by each of several jobs, it would be extremely difficult to make an overall comparison of this factor between jobs calling for entirely different types and degrees of exertions. This becomes clear when it is realized that the physical exertion required on one job might primarily be comprised of the application of acquired dexterities to repetitive work; on another job it might be principally comprised of the application of physical strength, such as the job of helping on a loading platform; and on a third job it might be essentially the application of intensive mental and visual concentration. With such variations present in both the types and possible degrees of exertion, a meaningful comparison between jobs can be made only if the various types of exertion are separated so that they can be individually evaluated and compared.

In the selection of the personal attributes and job characteristics to be used for measurement in the evaluation presented here, a careful analysis was made of 75 key jobs covering a cross-section of the work performed in the Bulova plant. These jobs were carefully studied and analyzed in order to make certain that the list of attributes selected for measurement in the evaluation included all of the factors from which any job derives its value. These attributes were compared with those used in other widely used plans of job evaluation.

In most of the plans of job evaluation examined, it was found that there is general agreement on the

basic attributes that should be measured. However, they varied widely in the manner in which point values were applied, and in the selection and definition of the specific characteristics to be measured.

All the plans examined, however, as well as the plan presented here, agree that the basic job requirements of all jobs are comprised of some or all of these four essential types of demand which are always made upon employees. These are:

(1) Mental demands
(2) Physical demands
(3) Responsibilities
(4) Working conditions

Although there is an overall general agreement between most widely used plans of job evaluation on the fact that the above requirements cover the total content of most types of work, there is a wide divergence in the selection of the specific job characteristics that should be measured.

The main points to be considered in the setting up of job factors for measurement, is that the factor defined be one which is objective and therefore amenable to positive measurement. For example, skill is generally agreed to be one of the most important items in creating job value. This is so because skill is generally difficult to find and frequently requires a long time to develop. Skill has been measured by the various plans in many different terms. The National Electrical Manufactures Assn. plan of job evaluation, for example, measures skill or technique through determining the length of time generally required in terms of experience which is required for effective performance, the education required to handle the work, and the initiative and ingenuity called for on the job.

In the plan of job evaluation presented here, which is for the most part based upon modifications of the basic technique used in the Industrial Management Society plan, experience required in terms of time necessary for learning has not been used as a factor at all. The factor of length of time required to be spent on a job for the proper learning, and for acquisition of speed, is a purely subjective one, and does not provide the basis for objective and consistent measurement.

This is true because it will frequently be found that the actual experience in terms of time required to be spent on a job in order to develop skill will vary widely from one employee to another. A job which may require five years for one employee to develop high skill might require another employee eight or nine years and a third employee only two or three years. "Experience required," therefore, is not a good objective measure of the skill demanded by any particular job.

A more objective yardstick can be found through an analysis of the elements which contribute towards the creation of skill in any employee. An examination of the skill demanded of an employee by a job will show that the required skill is invariably made up of three basic components in varying combinations: These are:

(1) The mental development required to complete a job successfully.

(2) The knowledge required to complete a job successfully.

(3) The dexterity and precision, and special techniques which are required to complete a job successfully.

Thus, while it is difficult to measure experience in any accurate manner, it is a comparatively simple matter to determine objectively the mental development, the type and degree of knowledge, and the dexterity and precision required by a job. Therefore, measurement of these factors has been substituted in order to provide an accurate yardstick of those job characteristics which are generally referred to as "experience and technique."

Defining the Job Factors

In all, 11 specific job factors have been selected as constituting the main sources of value for each job, and these have been established as a yardstick against which all jobs should be measured. Each of these job factors, through a procedure to be described, has been assigned a scale of point values. These values are intended to reflect the relative differences in the values of the various factors. For example, it generally requires an extremely wide range of variation in job conditions to exercise a significant effect on a job's total value, whereas very small differences in the skill or mental development required by a job can and do frequently exercise great influence in increasing or decreasing the value of the work.

An examination of the sources of the job value will show that this is due to the fact that skill and mental development are factors which exert more influence in determining job values than do working conditions. Since skill and mental development are frequently difficult to find and often require long periods of time to develop, it is proper that the point values assigned should clearly show these differences.

The manner in which each job can be weighed against the demands that it makes under each factor will be explained and illustrated and sample job descriptions and analyses will be offered in part two. These factors cover the principal sources of value for virtually every type of work. In some instances, it may be found that the point relationships may have to be adjusted in other industries. These values have been actually applied, however, in virtually all phases of precision metal products manufacture and have yielded an extremely high degree of satisfaction.

Following is a list of the job factors and a brief definition of each factor:

MENTAL REQUIREMENTS

(1) Mental development

Mental development and/or academic or technical training required as a requisite to the successful performance of a job. For convenience in measurement, mental development may be measured in terms of some equivalent level of formal education. It should be remembered, however, that though it is frequently present, formal education is not essential to a high degree of mental development.

(2) Knowledge

The amount of "know how" in terms of the specific knowledge demands of a job. Measurement of knowledge is made separately for:

a—Knowledge of methods, procedures techniques and processes

b—Knowledge of materials

c—Knowledge of tools and equipment

(3) Judgment and initiative

The requirement of a job which calls for the weighing of facts and the making of decisions as well as the active participation in carrying out decisions through appropriate action.

PHYSICAL REQUIREMENTS

(4) Physical skill

Those requirements on a job calling for dexterity and precision. Dexterity refers to those techniques requiring muscular control and coordination as well as a sense of rhythm and sensitivity of touch. Precision refers to the requirement for accuracy which is obtained through muscular control.

(5) Mental and visual demand

The degree to which the requirements of a job call for mental concentration and visual attention as measured by:

a—The type and intensity of mental and visual exertion required.

b—The continuity of the effort required.

(6) Physical exertion

The amount and type of exertion required by a job as measured by the strength and resistance to fatigue that is needed and the continuity of the effort.

RESPONSIBILITY

(7) Supervision

Responsibility for supervision is measured in two ways. The first is the degree of responsibility for the organization of the work of others, The second is the degree of responsibility for self-supervision.

(8) Safety of others

That characteristic of a job which involves the possbility of danger to others if the job is not carefully performed and thereby places a responsibility and obligation to others upon an employee. This may include responsibility on a policy making level as well as the direct responsibility involved in the physical performance of a task.

(9) Equipment and material

The degree to which a job being performed is likely to incur a financial or production loss to the company through damage to equipment or material or through losses in production as a result of negligence on the part of the employee. This places a responsibility for care and attention on the employee.

WORKING CONDITIONS

(10) Job conditions

Those requirements on any job which expose the employees to disagreeable conditions, such as, heat, cold and fumes, and tend to make a job undesirable from an employee point of view.

(11) Hazards

This job characteristic refers to any condition on a job which subjects an employee to the danger of physical harm. The degree to which a hazard exists on any job is measured by the extent of any possible injury or illness and also by the probable frequency of such occurrences.

Having selected and identified those characteristics which constitute the major source of differences in job values, the next step is to give recognition to the fact that they are not all of equal importance or value. In order to represent the relative value of each factor, weights or scales of points have been assigned to each. These points are both intended to provide a means for indicating the relative differences in total value between factors and also to enable us to measure the various degrees or intensities to which each element may be present on a job.

Though this means it is possible to measure accurately the amount of difference between jobs by means of an actual qualitative and quantitative analysis of the content of each job. Thus through the use of a point system it is possible to show both the relative position of each job in terms of value, as compared to all other jobs, and to indicate precisely where the difference lies.

Factor	Pct of Total	Number of Points
Mental requirements—51 pct		
(1) Mental development	13	65
(2) Knowledge		
a—Methods, procedures, techniques and processes	11	55
b—Materials	8	40
c—Tools and equipment	7	35
(3) Judgment and initiative	12	60
Physical requirements—24 pct		
(4) Physical skill	9	45
(5) Mental and visual	8	40
(6) Physical exertion	7	35
Responsibility—17 pct		
(7) Supervision	9	45
(8) Safety of others	3	15
(9) Equipment and material	5	25
Working conditions—8 pct		
(10) Job conditions	4	20
(11) Hazards	4	20

Ed. Note: Next week the application of point values to the job factors is described.

In order to arrive at a scale of point values, which would realistically reflect the actual differences in value between the various elements being measured, a careful study and comparison has been made between all of the personal attributes and job requirements present in the 50 key jobs which were selected for analysis. The contribution made by each factor to the total value of each job was analyzed and compared. As a result of this analysis and comparison it was found that certain elements appeared as an important source of value on all jobs. In addition by comparing the different weights exercised by any given component on each job analyzed, through this procedure it was possible to establish a value for that factor for each degree or intensity with which it was present on any job. This process was repeated for each factor until a scale of values was established for each one in every degree.

The following percentages indicate the importance which has been given to each factor in the assignment of point values:

	Pct
Mental requirements	51
Physical requirements	24
Responsibility	17
Working conditions	8

On the basis of these percentages a total of 500 points has been distributed between all of the factors. The number of points shown for each characteristic represents the maximum degree which will generally be found for that characteristic in this type of work. However, these values do not represent fixed limits. If new jobs occur, which require higher degrees of any factor than those shown in the detailed description, then additional values for these may be determined as required by a comparison with the values already shown.

The following tabulation indicates the values applied for each characteristic:

Precision . . .

By J. ALBIN
Associate Editor, THE IRON AGE

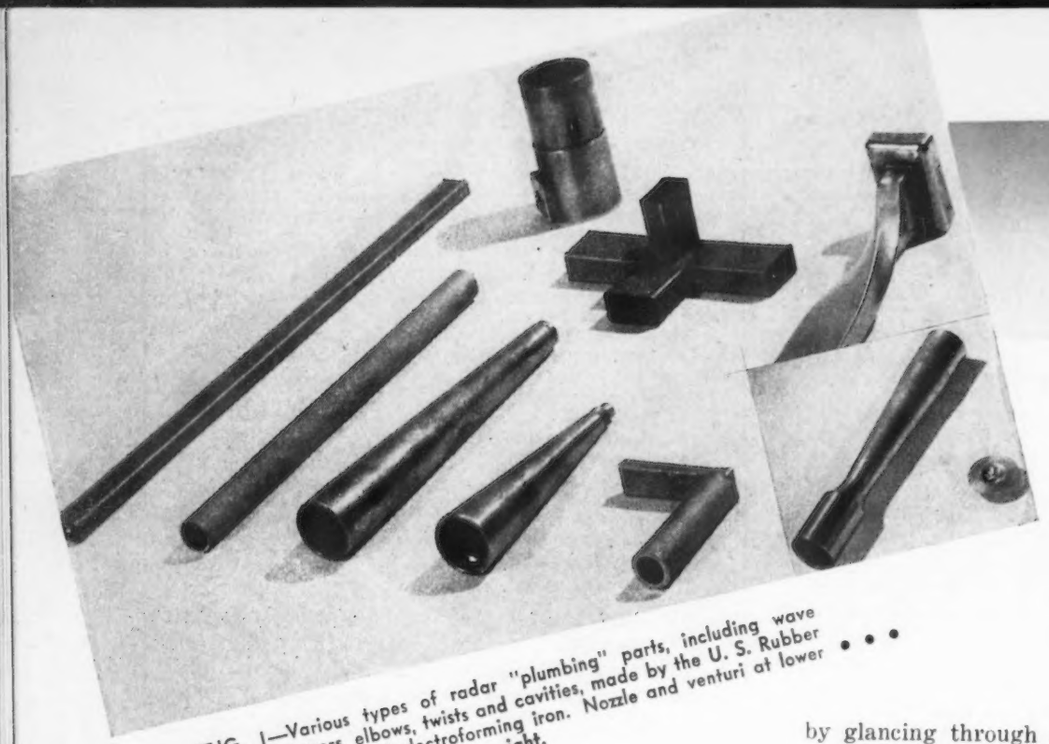


FIG. 1—Various types of radar "plumbing" parts, including wave guides, tapers, elbows, twists and cavities, made by the U. S. Rubber Co.'s Ekko process of electroforming iron. Nozzle and venturi at lower right.

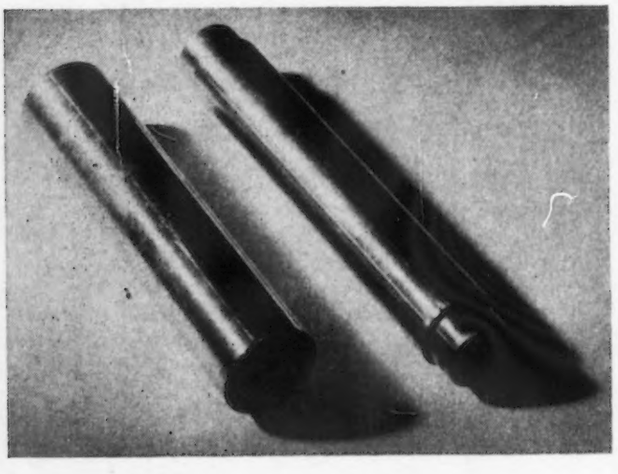
SEAMLESS tubing having highly accurate, mirror-like internal surfaces is being made by the United States Rubber Co. utilizing its Ekko process of electroforming iron. Parts of equal internal accuracy and surface finish in the form of elbows, S shapes and tapers would be most difficult to fabricate by any of the prevailing techniques for forming seamless tubing.

Primarily developed for radar, this tubing is now finding use where precision control of flow through venturis, nozzles, and injection systems is vital. Parts supplied have a great variety of shapes and sizes, including tapers, bends, twists, flares, elbows, cylinders, nozzles and venturis (see fig. 1). Cross-sections may be round, square, rectangular and elliptical, with or without fluted members. There is little if any limitation in internal cross-section. An important feature of the electroformed seamless tubing is the degree of surface finish obtainable on the inner surface, since rms. values of 5 m in. present no problem. An appreciation of the type of surface attainable will result by glancing through a length of rectangular tubing and noting the pattern of multiple reflections.

The rubber company's method is similar in external procedures to electroplating, but because of the much greater volume of deposited metal, it is called electroforming. At the time that the company became interested in electroforming with iron, over eight years ago, the art of plating iron was little more than a laboratory curiosity. The literature revealed how to plate iron having a satisfactory appearance. However, the experience of almost all experimenters was the same because this bath would start to give off brittle, cracked deposits after approximately three weeks' operation. This was also the experience of the U. S. Rubber Co. It was appreciated that some elusive factor of control was being overlooked. A program of many months' investigation revealed that one of the constituents had to be maintained within a few hundredths of one gram concentration for continued operation. Through the use of special electrolytes and controls, it is possible to create substantial homogeneous thicknesses of high quality iron in desired contours. Ekko iron plating installations frequently operate continuously for four or five years without any shutdown.

See article "Ekko Process of Electroforming," THE IRON AGE, *Oct.* 5, 1939, *p.* 38.

FIG. 2—Steel mandrel withdrawn from the electroformed tube. The accuracy and finish established on the mandrel has been imparted to the inside of the seamless tube.



While the base material in the Ekko process is generally pure iron, it is also possible to produce finished parts in the following materials: Nickel-lined iron, iron-nickel laminates, copper-lined iron and chromium-lined iron. Electroformed parts have also been produced in pure copper, copper laminates and a combination of some of the foregoing metals with gold.

Several methods for making parts completely of deposited metal have been perfected by U. S. Rubber Co. These consist primarily of plating on a matrix or a mandrel covered with a parting compound. The electroformed part is the sleeve of desired thickness. Its inner wall is a precise reproduction of the surface of the forming body (see fig. 2).

Electroformed deposits of iron can, of course, be made to adhere to the base metal. A common example is the resizing of mismachined or worn parts where a strongly adherent build-up of iron is supplied to the undersize surface allowing it to be remachined

Seamless Tubing by Electrodeposition

Accuracy of dimension and surface finish of intricate parts can be imparted to inside surfaces by United States Rubber Co.'s process of electroforming iron.

to the correct dimensions. One of the largest uses of this application occurred during the war and promises great potentialities in peacetime. When the diameter of the cylinder liner in a Navy diesel engine is worn 0.080 in. oversize, the liners are normally discarded. Wartime necessity for quick and reliable service from these engines will not tolerate the hand-fitting of oversize pistons and rings, as well as the out-of-balance conditions which may result. During the war, the shortage of critical machining capacity brought shortages in replacement liners and it became important to examine the salvage of worn liners (fig. 3).

The Ekko process was able to supply the answer although it meant adhering an electrodeposit on cast iron, which is generally considered a severe problem for a plater. Although the best grades of Meehanite are used in casting cylinder liners, the worn surface which is exposed will contain particles of graphite as well as pores which retain oil residues—either of these conditions tends to produce a pitted, poorly adherent electrodeposit. It was determined that the oil residues could be eliminated by a pretreatment of the liners in one of the Kolene process molten salt baths operating at a temperature of 800°F. This treatment was followed by a selective electrolytic etching process which produced a clean surface giving maximum adhesion of the electrodeposit. Thereafter, use of a target anode located in the center of the liner as it hung in the plating bath allowed the deposition of around 0.100 in. of iron on the undersize wall.

In some cases, the resized liner was machined and lapped a few thousandths undersize and a coating of porous chromium applied for additional wear characteristics. In other cases, the electroformed iron was operated without the addition of chromium and wear results were reported as good or slightly better than the cast iron.

In developing the technique for adhering Ekko iron to base metals, the many tests run were evaluated by a variation of the Ollard method.[1] This interesting test is operated by applying a minimum of ¼ in. of electroformed iron to the face of a cast iron test piece following proper pretreatment. The bond developed is then ruptured on a conventional Olsen test machine by supporting the electroformed iron on a ring and having a plunger push against the cast iron through a hole in the electroformed iron. The area supporting this load is carefully measured and the point of rupture noted in pounds on the Olsen machine. Values up to 35,000-lb bond are readily obtained and, in many cases, the cast

[1] *Ollard: "Adhesion of Deposited Nickel to Base Metals," Trans. Faraday Soc.*, 21, 81 (1925).

FIG. 3—Inspecting resized Navy diesel liner. Worn cast-iron liners are salvaged by adhering a heavy deposit of electroformed iron to the internal surface.

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FIG. 4—Electroformed iron (right) plated on cast iron (diesel liner). Magnification 500 X. The cast iron ruptures before the bond when subjected to Ollard test.

FIG. 5—Large electroformed radar feed horn. Note preferential build-up on corners for increased rigidity. Horns formerly made up of twisted welded sheet lacked internal smoothness.

iron will break prior to rupture of the electroformed bond.

In fig. 4 is provided a microstructure analysis of the electroformed iron on the cast iron in the diesel liner.

Radar parts made by U. S. Rubber Co. practically attain the ideal specifications established by calculations. At the frequencies needed for radar, the electromagnetic waves do not flow along the surfaces of the conductor (wire) but tend to fly off into space. Tubing or wave-guides are necessary, for by feeding electromagnetic waves to the inside of a tube, they are retained on the inner surface and flow as a liquid through pipes. When they reach the end of the guide, they are radiated in a beam. The weak return impulses entering the receiving side of the radar pass through an equally intricate mass of tubing and communicating chambers. The presence of any obstruction or unevenness in the wave guide results in reflections which tend to interfere with the efficiency of the radiated beam or the sharpness of images that are seen on the radar screen. Before the application of the Ekko process, much radar "plumbing" was made of sheet metal welded together. It was not possible by this method to have parts without obstructions and irregularities. A description is now given of the feed horn, fig. 5, a special radar device installed in TBM planes, to illustrate the matrix principle of fabricating seamless tubing.

When this device was first perfected at the radiation laboratories of the Massachusetts Institute of Technology, experimental feed horns had been made by conventional methods of fabrication. They were built up out of sections of twisted metal tubing welded together. The finished part weighed about 15 lb, more than had been allowed in the Navy specifications. Welding of three sections together resulted in irregularities at the joints which caused reflections. It was impossible to achieve a dimensional accuracy necessary for uniform results, and it was impossible to obtain a continuously smooth internal surface essential for undisturbed flow of the radiating electronic waves. The present product is made in one piece and its weight reduced from 13 to 5.5 lb. A horn has a mirror-like inside surface and all dimensions are held to more rigid tolerances than originally appeared possible. Finally, all feed horns produced by this method are identical, since they are made on patterns cast from the same mold and therefore special tubing in the radar circuit to compensate for differences in individual feed horns is eliminated.

FIG. 6—Opening the mold to remove slush casting of low-temperature melting metal. Use of single mold permits exactness in reproductions.

Lapped-Steel Mandrels Used

In an iron mold, a slush casting is made of low temperature fusible metal. The mold is opened up, see fig. 6, and the casting removed. This casting or matrix has the required dimensions but there are imperfections in the surface which must be corrected. This work is done by skilled operators who add metal to fill orifices and trim down projections. When the matrix appears satisfactory under a magnifying glass, it goes to a buffing machine and receives a very smooth glass-like finish. After careful inspection (see fig. 7), the matrix is given a flash parting compound and immersed in the electrolytic bath. Iron is built up to the desired thickness. U. S. Rubber Co. has developed some interesting techniques which make possible the adding of metal at the corners for strengthening purposes and also at the feed orifice to permit machining in order that another part be fitted on to it. The matrix is then melted out leaving an inner surface which is the exact reproduction, including surface finish, of the cast. The horn receives a nickel plating to accord with Navy specifications on corrosion.

The matrix method is particularly useful in producing bends, tubes requiring twists and S-shaped sections where it is not possible to use a mandrel. An accuracy of ± 0.001 in. is possible in a tube of any contour.

Where extreme limits of accuracy are required, the parts are made by electroforming on accurately ground and lapped steel mandrels. Using this type of master,

a parting material is applied to the surface which may be as thin as a millionth of an inch. After electroforming to the desired thickness, the tube is withdrawn under heat and pressure thus producing a seamless tube having an accurate inside diameter with a tolerance of ±0.0002 in. The mandrel is again available for reprocessing.

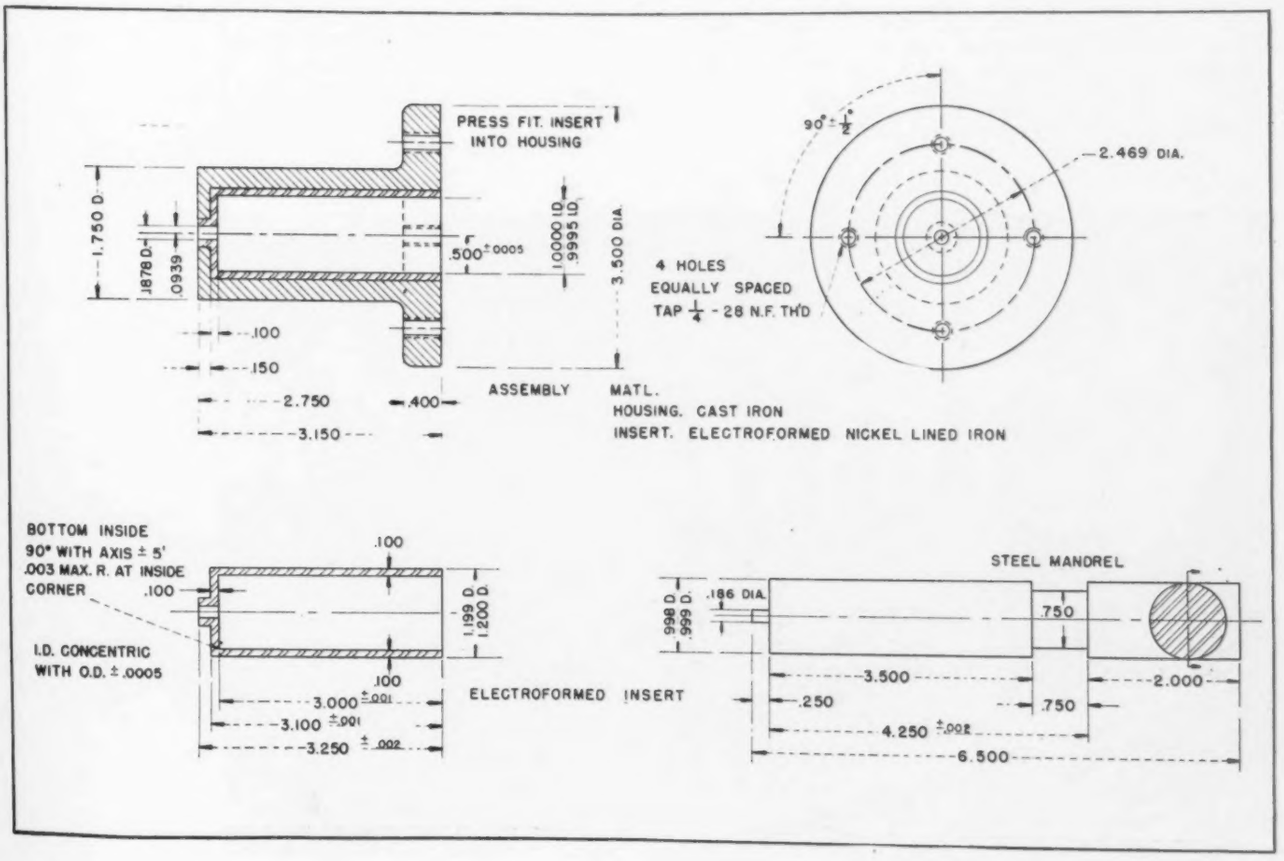
A representative assembly using an electroformed precision tube as an insert is illustrated in the drawing, fig. 8. The steel mandrel is placed in the electroforming bath for a build-up of metal slightly in excess of 1.200 in. The next operation is to machine the deposit back to 1.200 in. while still on the mandrel. The electroformed insert having a wall of 0.100 in. thickness is drawn off the steel mandrel and will have an OD and ID which are perfectly concentric. This feature of concentricity is a unique fabrication operation made possible by the electroforming method. The electroformed insert is then pressed into a cast housing machined to receive it. Of course it would not be economical to build up the entire assembly with the deposited iron. However, the construction illustrated takes advantage of the accuracy, finish and unusual contours possible with electroforming while maintaining low cost.

There is no limitation of shape as long as a mandrel may be pulled away from the electroformed part. The method is not limited to cylindrical sections, but can be applied to rectangular, curved and fluted sections. Lengthwise it is possible to have a tube that is tapered having internal shoulders and steps. Lengths of tubing longer than 3 ft have been made and diameters run from $\frac{1}{8}$ to 3 in., the limiting factor being the availability of mandrels.

FIG. 7—Inspecting the highly polished matrix. Surface finish of matrix is transmitted to electroformed counterpart. Accuracy of ±0.001 in. is possible irrespective of shape or contour.

According to the Ollard tests made on the electroformed iron bonded to cast iron, as mentioned above, the cast iron broke prior to rupture of the bond. Some idea of the manner in which the particles of electroformed iron build up on a base metal can be gained from the photomicrographs in fig. 9. These show the iron as plated and bonded to low-carbon steel plate (SAE 1010). The typical needle structure of the electroformed iron (as plated) is apparent as well as the conventional structure of the 1010 steel. A mag-

FIG. 8—Method of employing an electroformed nickel-lined iron insert in cast iron housing. Economy is achieved by this two-part construction over a single electroformed part.



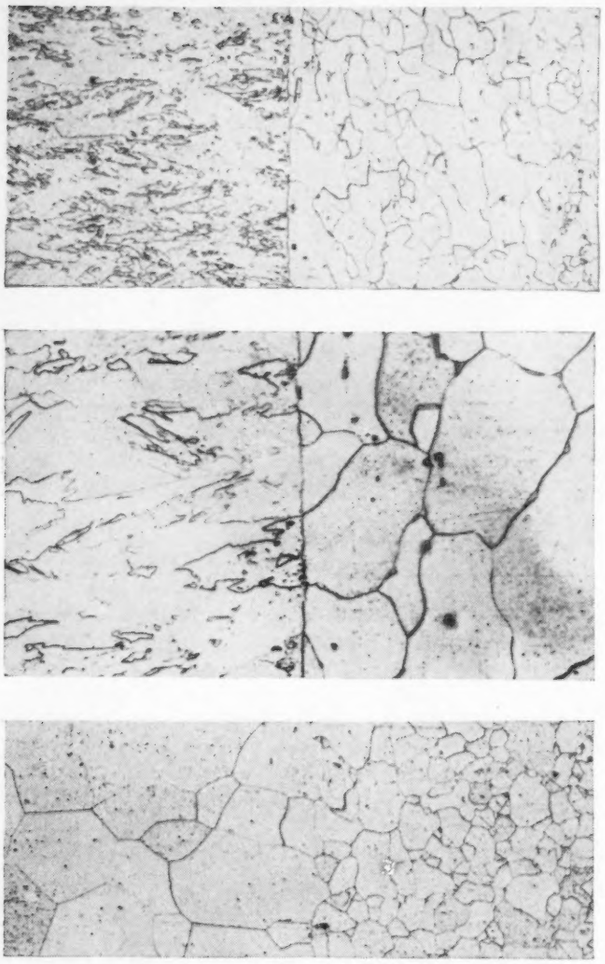


FIG. 9—(Top) Iron as plated and bonded to SAE 1010 steel. Typical needle structure of the electroformed iron at left is apparent as well as structure of steel at 100X. (Middle) Higher magnification (250X) of the boundary line. The crystals of iron tend to fit into the grain boundaries of the base metal. (Bottom) Sample after heat treating at 1650°F.; iron passes from needle to ferrite grains (100X).

nification of the interface brings out how the crystals of iron tend to fit into the grain boundaries of the base metal; the boundary lines running from the base into the deposited metal. The same sample is shown after heating to 1650°F where the iron passes through a transition going from typical needle to conventional ferrite grains. The needle-like iron Brinells 225 to 240, but after heat treatment at 1650°F it is fully annealed and Brinells 140. Electroformed iron after it has been gas carburized and the case converted to steel, shows a typical pearlite structure as well as the case fading out into pure ferrite. A further conception of the range of service possible with electroformed iron is indicated by the table of physicals following:

Tensile strength, psi	55,000
Elongation, pct	10 to 15
Brinell hardness	225
Structure	needle-like crystals
Melting point, °F	2792
Annealing point, °F	1110 to 1163
Thermal conductivity, BTU per sq ft per in. thickness per °F	438 to 468
Coefficient of linear expansion, in. per °F	0.00000661
Specific gravity	7.87
Weight, lb per cu in.	0.2842
Modulus of elasticity, psi	29,700,000

Under the direction of Dr. E. H. Wallace, U. S. Rubber Co. engineers have extended electroforming techniques to produce parabolic mirrors, computing cams for automatic gun sighting devices and radio antenna masts for Army and Navy planes. The last-named application is particularly interesting from a plating standpoint. Here the iron was electroformed on a base consisting of compregwood covered with a layer of rubber, fig. 10. The rubber fulfilled the functions of sealing the compragwood, supplying a uniform medium for bonding metal to compregwood and lastly, if not most important, it served as a cushion to absorb the difference in expansion between metal and compregwood occurring when a plane left the warm atmosphere for the intensely cold stratosphere region. A mast formerly made of plastic laminates broke away from the plane when subjected to speeds in excess of 400 mph. During the war the company was able to supply the armed forces with over 300,000 of its masts.

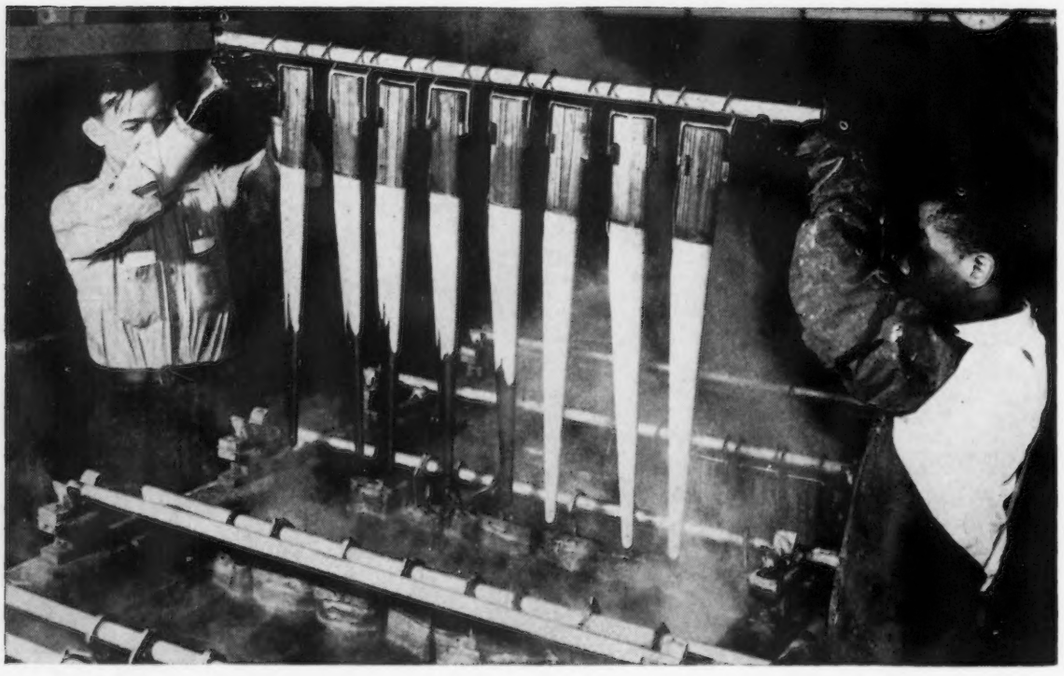


FIG. 10—Electrodepositing pure iron on rubber-covered compregwood antenna masts. An iron coating starts to form on the copper wire located along edge and gradually creeps down across the surface of the rubber. The five masts on left are partially covered, the three on right completely covered.

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High-Pressure Feeding of Static Molds

Prime factor in producing consistently sound castings is the application of pressure in the feeding of castings. By exerting pressures greater than that of centrifugal casting, static molding can be used to give exceptionally high yields. The process developed by the authors (patents have been applied for in all countries) utilizes gas pressure built up in the feeder head and an exothermic reaction to create sufficient heat to compensate conduction and radiation losses. In this two-part article, the theory and practice of this new feeding method are outlined.

By S. T. JAZWINSKI and S. L. FINCH

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IN the early days of steelfounding, when the craftsman was the only source of knowledge, large feeder heads utilizing gravity pressure only were used to produce sound castings. This resulted in a low yield of castings from liquid metal with uneconomic production and low unit productivity per manhour. Frequently castings were unsound even though fed with large heads due to lack of understanding of the physical laws governing solidification and shrinkage in castings.

Alternatively, in a desire to achieve greater economy many castings have been made with a reasonably high yield but without proper compensation for liquid shrinkage, resulting in a certain degree of unsoundness. With the advent of science into the modern foundry, combined with the valuable experience of past work, balanced methods of feeding, directional solidification, and applied pressure have all been studied and used in the foundry. Where a thorough understanding of the basic laws has been achieved, castings are produced at a more economic figure and are equal if not superior in quality to those produced in the past.

A few years ago the Williams riser, scientifically studied by Taylor and Rominski,* showed the value of increased pressure in a feeder head. At the same time, centrifugal casting methods were being evolved which resulted in higher yields and consequent saving in feeder heads. Unfortunately this last method of applying pressure required relatively expensive plant, equipment and maintenance. Nevertheless the great increase in yield has compensated for this outlay in capital. One drawback of the centrifugal method is that it is limited in its application, although the range of castings made by this method has been increased in recent years.

An elementary deduction is that to increase the yield of castings one must obey all the basic laws and in addition they must be applied in such a way that the waste metal forming the feeder head is reduced to a minimum. One can observe that, keeping every other factor constant, increase in yield can be obtained by increasing the pressure from gravity pressure through atmospheric pressure to centrifugal pressure. The logical conclusion now drawn is that if this pressure is further increased, a relative increase in yield is obtained.

In the preliminary steps of this work, many heads were sectioned and the type of shrinkage cavity and its history noted. There is no doubt that the type of shrinkage cavity obtained is one of the most informative features, an aspect which has been neglected in the past in foundry technology. If standard conditions are observed, the character of the shrinkage is governed by the pressure. All gravity heads tend more or less to have a carrot shaped cavity extending deep down the head with a considerable amount of secondary piping.

Atmospheric heads are slightly more globular in shape and have little, if any, secondary piping. In the case of a centrifugal casting, where the head and runner are one unit, there is definite trend for the cavity to be flat bottomed.

The height of a feeder head necessary is determined by the length of shrinkage cavity. Consequently, if

*H. F. Taylor and E. A. Rominski, "Atmospheric Pressure and the Steel Casting—A New Technique in Gating and Risering," Transactions of the American Foundrymen's Assn., 1942, vol. 50, p. 215.

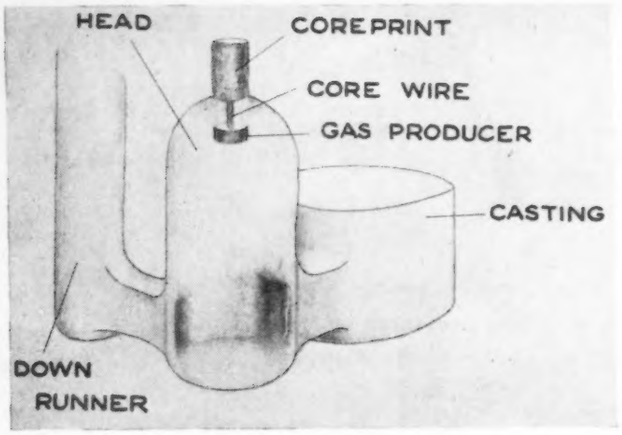

FIG. 1—Introduction of Kayell compound into feeder head.

the cavity is globular instead of carrot shaped, a constant volume of casting will require less of head height and will result in an increase in yield. In previous experiments, using graphite rods, a perfectly flat bottomed cavity was obtained in one of the feeder heads. General observations made led to the assumption that pressure was being exerted, causing this unusual type of shrinkage cavity.

When the relationship between the types of shrinkage cavity and applied pressure was established, it became clear that theories on the formation of shrinkage cavities in feeder heads must be reevaluated. This deduction was followed by a series of experiments, and it was found that the size and type of shrinkage cavity formed in the feeder head were proportional to the pressure applied. Under gravity or even atmospheric pressure, the formation of the shrinkage cavity is the result of a complicated series of changes to which a number of physical properties contribute, and of these, pressure is of paramount importance. In the experiments there were many instances where the pressure was in excess of even that obtained in centrifugal castings. These conclusions and experimental evidence led to a new method of casting, with a greater pressure in the feeder heads giving greater soundness with a much higher yield than normally obtained.

Orthodox (gravity) or atmospheric heads require maximum fluidity to fill all parts of the mold if the casting is to be perfectly sound. It is well known that it is very difficult to control this feeding, even when all the fundamental laws of feeding are observed. In addition, the yield is low when using gravity heads, and, although higher when using the atmospheric type, the amount of metal in the feeder heads is still greatly in excess of the theoretical amount required. Naturally the maximum yield which can be obtained is limited by the existence of various factors such as radiation and conduction losses and lateral solidification of the head. Due to these, and other factors, some metal must be supplied in excess of the theoretical amount required to compensate for liquid shrinkage. All the experiments detailed in this paper have been made with steel castings but the same principles are applicable (to a greater or less degree) to other metals and alloys. Volume changes which occur in liquid steel before and during solidification are rather pronounced.

At 20°C density is 7.875 g per cc.
At 1530°C density is 7.126 g per cc.

The influence of the elements, like carbon, silicon, manganese and phosphorus, cannot be overlooked, as these increase the above mentioned figures.

The most reliable experimental data gives an average shrinkage in passing from liquid to solid state of 3 pct. Obviously a casting temperature higher than that at which freezing commences must be used and this increases pro rata the amount of liquid shrinkage for which provision must be made, and in practice it has been found that a figure of 6 pct is sufficiently reliable to be used for total liquid shrinkage.

Liquid metal must be supplied to the solidifying casting to compensate for liquid shrinkage. This metal is supplied by the feeder heads into the casting. Existing methods use three types or combinations of these three types of forces, namely gravity, atmospheric pressure and centrifugal pressure developed in a rotating mold. If the pressure is high enough to force the metal from the feeder head to the casting and at the same time form a flat bottomed cavity in the head, the feeder head can be reduced to a minimum, resulting in a very high yield. The experiments which are described prove this point and, as a result, castings were made with exceptionally high yields, some up to 95 pct.

High Pressure Eliminates Shrinkage

The investigations were made particularly on castings having T sections, which, when made by existing methods of feeding, show a tendency to have small cavities or porosity at the junction of the section. By previously known feeding techniques, this design has always been considered detrimental to the production

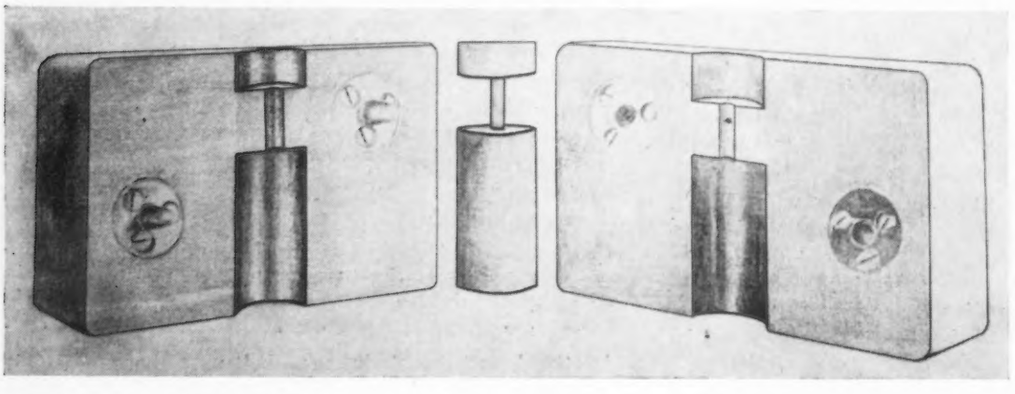

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FIG. 2 — Open corebox showing completed core in position. The gas compound hangs 1 in. from the top of the head suspended by means of a small wire attached to a core print.

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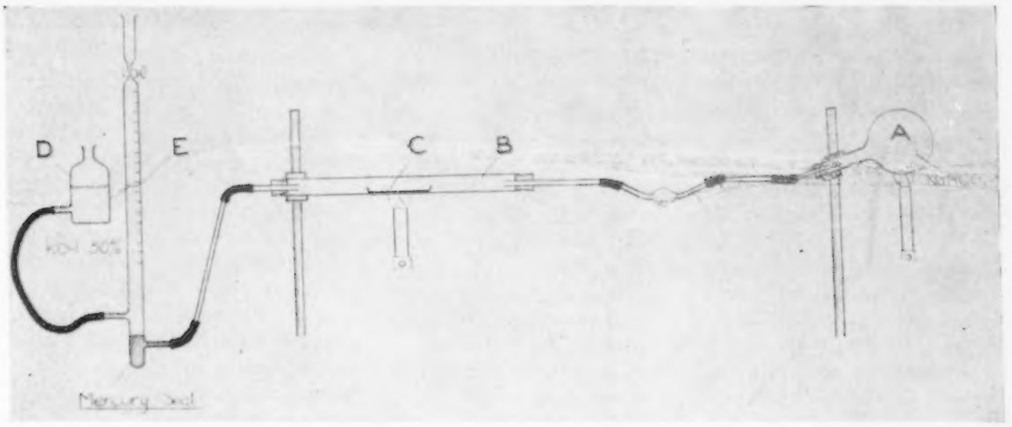


FIG. 3 — Apparatus used to estimate amount of gas evolved by Kayell compound.

of sound castings, but it appears that when using high pressure in the feeder head, shrinkage cavities can be overcome. The laws of directional solidification must be obeyed if the head is to be the last to solidify. In this respect it would appear essential to introduce into the feeder head a sufficient amount of head so that the head can remain in a liquid state and retain its fluidity much longer than is the usual practice. This would mean that any pressure developed would be exerted on a whole liquid surface, and not on a portion of the liquid center, as has been the case in previous existing methods.

It is clear that (a) pressure must be applied and (b) a liquid interior in the head must be maintained for a long time if a maximum yield and minimum waste are to be obtained. These ideas, conclusions and experimental evidence led to the discovery by the authors of the new method of feeding, namely gas pressure feeding.

This consists of casting metal in molds having one or more feeder heads in which there is introduced into the feeder heads, before casting, a charge of a material adapted, after a surface skin or envelope of solid metal has formed in the feeder head, by cooling, to create a gas. Pressure of the gas will act upon the liquid metal to force it into the mold in which the casting is formed.

Additionally, there can also be introduced an exothermic composition such as a mixture of iron oxide and aluminum. The amount added is sufficient to create a certain amount of heat to compensate conduction and radiation losses. The gas and head evolution compound is, for simplicity throughout this paper, called Kayell compound.

Normally the compound producing gas and heat is contained in a refractory or other container, adapted to withstand heat of the liquid metal for a certain time, thus preventing the heat of the liquid metal from acting on the compound until such time as an air tight frozen envelope has been formed in the feeder head. These two factors—pressure and heat—result in a globular cavity with a meniscus inside the feeder head.

Mechanism of Metal Supply

The introduction of the mixture into the feeder head is made in a simple manner and is shown in fig. 1. This method consists in having a special core made which is easy to manufacture in everyday practice. The corebox shown open in fig. 2, with the completed core, illustrates the method used, and the article is fastened in the mold as shown in fig. 1. From this illustration it can be seen that the gas compound hangs 1 in. from the top of the head, suspended by means of a small wire, which in its turn is attached to a core print which fits tightly in the mold.

When the head is completely filled with liquid steel the gas compound is surrounded on all sides by liquid metal. The head is almost immediately enclosed by a gas tight container of solidified steel. This thin skin or shell is formed by the sudden chilling action of the relatively cold mold. The object is to have the gas compound suspended as near to the top of the feeder head as possible while at the same time the method of suspension must isolate this compound from the mold.

Short after this compound is surrounded by liquid metal, the exothermic reaction begins, and gas and

TABLE I

Relation Between Different KAYELL Compositions and Gas Evolutions

Composition No.	1	2	3	4	5	6	7	8	9	10
Gas evolved cc at N T P from 1 gram	11.5	21.5	28.0	29.2	31.0	31.5	33.5	34.0	35.3	36.0
Gas evolved cc at 1500° C, P=76 cm Hg	63.2	118.0	154.0	160.2	171.5	173.5	184.0	187.0	194.1	198.0
Composition No.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Gas evolved cc at N T P	43.5	55.0	59.0	61.0	62.0	76.0	109.0	152.0	204.0	222.0
Gas evolved cc at 1500° C, P=76 cm Hg	239.0	303.0	325.0	335.0	342.0	417.0	599.0	835.0	112.0	122.0

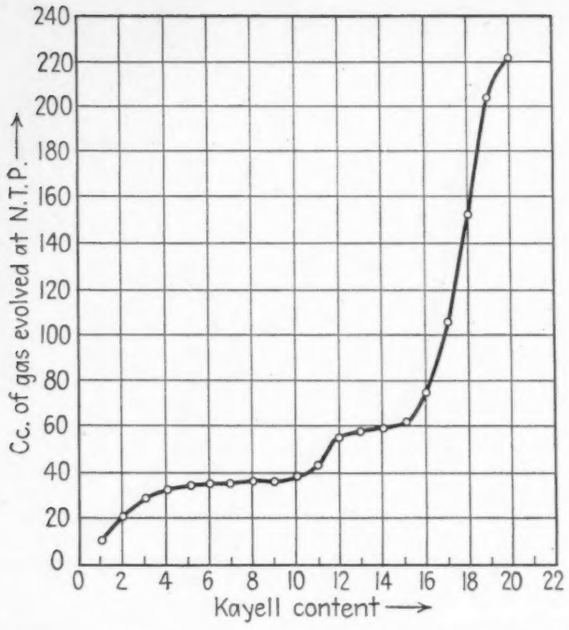


FIG. 4—Relation between Kayell content and amount of gas evolved.

heat are evolved. The heat is absorbed by the metal in the immediate vicinity and the gas evolved is trapped in the thin shell of metal enclosing the head. Both quantities of gas and heat evolved can thus be introduced simply and practically at little cost, but before showing the action of both gas and heat, the method of controlling these two important factors should be reviewed.

In the early stages of development several gas and exothermic compounds were made which, for simplicity, are called Kayell 1, Kayell 2 . . . Kayell X. The amount of gas evolved was estimated by the apparatus shown in fig. 3. A sample weighing 0.1 gram was placed in a combustion boat and the latter in a silica combustion tube. The air in the apparatus was then replaced by carbon dioxide given off from the flask containing sodium bicarbonate. When this was completed, the combustion tube was heated to approximately 900° C (1652° F). At the same time the sodium bicarbonate was heated gently, so that a steady flow of carbon dioxide was obtained. As the mixture decomposed, hydrocarbons and a little carbon monoxide were given off. All the gases were collected in a eudiometer above a 50 pct potassium hydroxide solution. The residual gas was in its turn washed out with carbon dioxide.

The whole operation lasted about 30 min., after which the eudiometer was disconnected and the reading taken after an additional 20 min. At the same time the temperature and pressure were noted. The readings obtained were corrected to NTP and an allowance was made for the saturated vapor pressure of water. The corresponding values of the correction factor can be found in physical constant tables. Every determination was made under these standard conditions, as even with all precautions the experimental error amounts to ± 5 pct of the determined figures.

The results obtained are included in table I. All the determinations were corrected to NTP, but as the actual conditions are between 1500° and 1550° C (2732° and 2822° F) the volume at that temperature was calculated from the formula:

$$\frac{1}{273} \times T \times A = X$$

where T = 1500°C

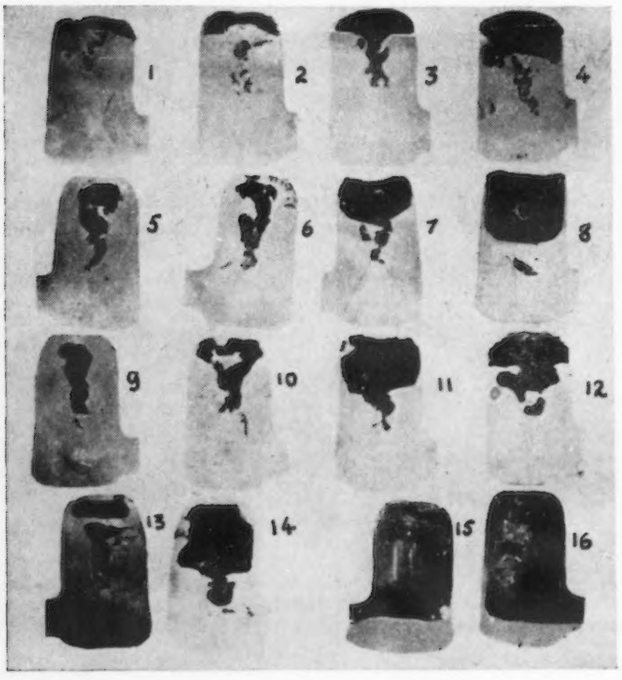
A = amount of gas in cc evolved from one gram of mixture at NTP

X = amount of gas in cc evolved from one gram of mixture at 1500°C

Having obtained the results shown in table I, the graph shown in fig. 4 was drawn and the remainder of the experiments were completed using the graph.

Using fig. 4, four mixtures were taken on which further experiments were conducted. The results obtained on a series of experiments are shown in fig. 5. Comparing sample 3 with sample 15, while the former pressure was not sufficient to give a sound casting, the latter pressure proved to be so great (approximately 300 psi) that the metal burst through the solidified skin and lifted the mold. Sample No. 15 was produced using Kayell 20 and No. 3 using Kayell 2 composition. It became apparent that it was necessary to employ compositions with a gas evolution higher than Kayell 2, or if using Kayell 20, a means for delaying the pressure action would have to be used so that the skin surrounding the head would be sufficiently strong enough to resist this exceptionally high pressure. Experiments were then conducted to determine the best and most economical method of delaying the pressure action.

FIG. 5—Sectioned heads showing different delaying and pressure actions. Vertical rows are representative of varying delaying actions and horizontal rows of different Kayell compounds.



Delaying Gas Pressure Action

The success and advantages obtained when using gas pressure are dependent on the formation of a thin solid shell of metal around the head, so that the pressure is exerted at the right moment in a closed container. This experimental evidence led the authors to develop various means of delaying the pressure

action so that a comparison could be made from three points of view, namely (1) success, (2) economy, (3) practicability.

The three chief methods experimented with were (a) enclosing the compound in a copper tube; (b) enclosing in a steel tube, and (c) coating with a thick refractory paint. These three were compared with an unprotected compound capsule.

In fig. 5 are 16 heads produced by using four different mixtures and the three methods of delaying the pressure action and one unprotected. The vertical rows are representative of different delaying actions and the horizontal rows are representative of various Kayell compounds.

First row vertical	(heads 1,5,9,13)	steel case used for delaying action
Second row vertical	(heads 2,6,10,14)	copper case used for delaying action
Third row vertical	(heads 3,7,11,15)	Refractory paint
Fourth row vertical	(heads 4,8,12,16)	No protection at all
First row horizontal	(heads 1,2,3,4)	Kayell (2) composition
Second row horizontal	(heads 5,6,7,8)	Kayell (4) omposition
Third row horizontal	(heads 9,10,11,12)	Kayell (6) composition
Fourth row horizontal	(heads 13,14,15,16)	Kayell (20) composition

On each horizontal row (see fig. 5) the size of the cavity is seen to increase as the delaying action is decreased, and using the same delaying action (see vertical rows) the cavity increases as the gas evolution increases.

Briefly, the action is that as soon as the metal fills the head, a chilled skin forms a chamber in which any gas given off causes an immediate pressure, resulting in more efficient feeding. The mixture is so made that an exothermic reaction occurs at the same time as the gas evolution takes place. This exothermic reaction prolongs the active life of the head, resulting in increased feeder efficiency. As can be seen from the experimental work carried out, this pressure can be controlled by quantity and composition of the mixture. In addition the amount of head metal subject to pressure can be controlled by using various delaying actions. For example, the actual pressure which is developed has been calculated for No. 8 in fig. 5, where the volume of cavity is 300 cc. The compound used in this particular case was Kayell 4, which from fig. 4 evolves 154 cc of gas per g at 1500° C (2822° F). Since the standard weight of the gas compound used was 10 g, the gas evolved was in the region of 1540 cc, which meant that the actual pressure developed was equivalent to approximately 5 atmospheres (75 psi). The pressure obtained can, from the figures in fig. 4 and the volume of cavities obtained, be calculated in each case.

Having established the theory in practice much further detailed experimental work was done before the conclusions drawn were applied to actual castings.

Next week this article is concluded with a detailed description of the actual production of castings with gas pressure feeder heads.—Ed.

Sodium Silicate Sealing of Aluminum Castings

THE sodium silicate system of sealing aluminum castings is not always completely effective according to tests made by the production development laboratory of North American Aviation Corp., Inglewood, Calif. Although the castings seemed to be completely sealed immediately after treatment, many developed leaks at the end of a 4-week period. The important fact observed, however, in connection with castings which exhibited leaks was that such leakage remained fairly constant thereafter.

An attempt was also made to secure additional protection against leaking by baking some of the castings at 220° for 2 hr after the sodium silicate treatment. No measurable effect was known to result after baking.

Before given the sealing test castings were tested for leakage under water by submitting them to an air pressure of 70 psi. The exact leakage was determined over a 5-min period by carefully measuring the amount of air coming from the casting under test. One-half of the castings after sealing were baked in an oven for 2 hr at 220° F. The castings were then air-pressure tested as given above, and were tested again after 4 weeks, 5½ weeks and 10 weeks in order to determine if the sealing effect of the sodium silicate had changed. The results of the tests are given in the table.

Sodium Silicate Sealing Test on Aluminum Castings
(70 psi air pressure under water)

Casting Number	Leakage Before Sealing	Leakage After Sealing (milliliter per min)			
		4 hr	4 weeks	5½ weeks	10 weeks
3*	1.2	0.00	0.03	0.10	0.08
7*	2.3	0.00	0.00	0.00	0.00
8	5.5	0.00	0.00	0.00	0.00
9*	0.5	0.00	0.02	0.05	0.08
12	2.0	0.00	0.00	0.00	0.00
13	0.5	0.00	0.00	0.00	0.00
14*	3.2	0.00	0.01	0.03	0.05

* These castings were baked after sealing at 220° F for 2 hr.

Special Attachments Speed

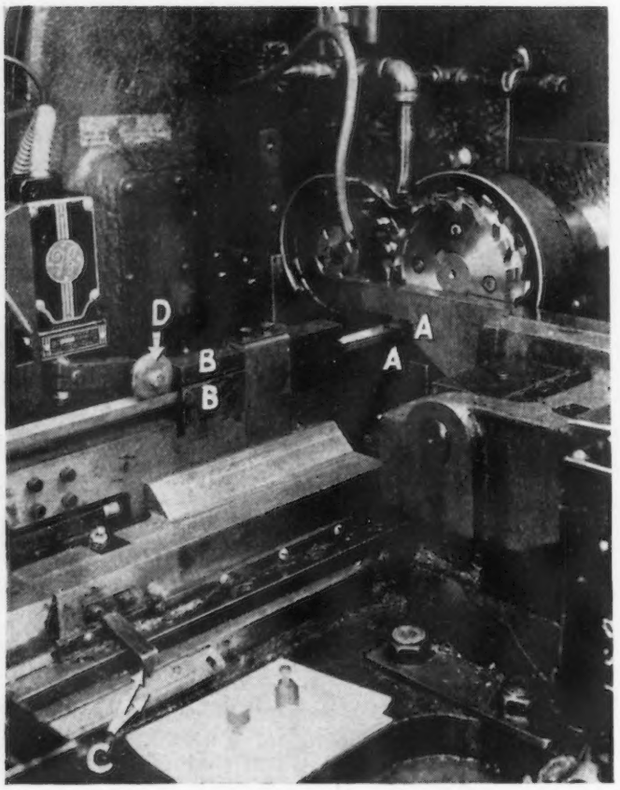


FIG. 1—Close up of special fixture for machining turbine buckets from metal strip on standard mill equipped with two-spindle head.

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FACED with a demand for large numbers of turbine buckets, and unwilling to devote a great amount of time to designing and constructing a special machine tool to cut off and machine these from preformed strip stock, engineers at General Electric's Lynn River works made a careful study to determine whether standard machines could be used. Formerly the operation was performed on a specially adapted milling machine having three spindle heads and complicated controls. Now, a two-spindle head machine is used to mill the dovetail and cut off the stock, and a standard machine to mill the tenon. Special fixtures with connections into the hydraulic systems of the machines were, of course, the means whereby automaticity was obtained.

For the first operation a standard 2H24 rise-and-fall manufacturing-type milling machine was equipped with a special two-spindle cutting head and a fixture for supporting, clamping and feeding the strip stock. The rear spindle was fixed in the head, but the front spindle was provided with a means of adjustment for changing the center distance of the two cutters, since it was desired to machine various sizes of buckets. A quill adjustment was also provided for axial positioning of the cutters.

As shown in fig. 1, the fixture consists of a main clamp jaw A operated by an air cylinder, and an auxiliary clamp B operated by a second cylinder. These auxiliary jaws are mounted on the sliding carriage of the fixture which is actuated by a hydraulic cylinder, the supply for which is taken from the regular hydraulic system of the machine. The travel of the carriage, which is proportional to the length of the bucket being machined, is controlled by adjusting a stop screw, and indicated by the pointed and scale C.

Engagement of the feed cycle of the machine is controlled by a solenoid connection to the machine trip lever, and a roll D, mounted on a limit switch, operates to stop the machine cycle when the end of the stock has passed into the auxiliary jaws. This prevents the machine from feeding a stub end of stock too short to be held in the main jaws, which might result in breakage of the cutters.

When both sets of jaws are closed, the machine cycle is started by means of a solenoid, the spindle descends in rapid traverse until the cutter nearly approaches the work, when the feed is reduced for the start of the cut. Feed is then automatically increased, and one bucket is milled and cut off. At the completion of the cycle, the spindle returns in rapid traverse to the top position, the main jaws A open, and the carriage advances under the action of the hydraulic cylinder to feed stock into the main jaws, the auxiliary jaws C remaining closed to carry the stock. As the carriage reaches the end of its stroke the main jaws close, the auxiliary jaws open, and the carriage returns to its normal position. The auxiliary jaws then close, the solenoid is energized, and the cycle repeated continously until such time as it is stopped by the operator or interrupted by the roller D running off the end of the stock.

For the second operation a standard 08 rise-and-fall manufacturing-type mill is used, and is also equipped with a special fixture, as shown in fig. 2. The parts are loaded into a vertical magazine A where they are held and supported, concave side up, by the dovetail milled in the previous operation. An electric vibrator is attached to the magazine to facilitate the sliding down of the buckets by gravity. At the bottom of the magazine a bucket is fed into the V block B which is equipped with a push rod C, adjustable for length of stroke and operated by an air cylinder. Jaws D, operated by a toggle clamp and an air cylinder,

Turbine Bucket Production

hold the work for milling. A positioning stop attached to the spindle carrier serves to control the length of the bucket.

When the machine is started, the spindle carrier is in the upper position, and the push rod pushes a bucket along the V block and into the jaws, which then lock by means of the air cylinder. A solenoid is then energized to engage the spindle carrier and cause this to descend in rapid traverse, feed through, and rapid traverse up to stop. At this point the jaws open, and a new bucket is pushed into position, ejecting the finished part. The jaws then close again and the cycle is repeated until the magazine is empty or the operator stops the machine. The depth of the cut and the height of the tenon is controlled by the longitudinal adjustment of the table carrying the fixture, and by adjustment of the positioning stop. Centralization of the cutters is controlled by quill adjustment of the machine. The entire fixture may be swiveled on the table if desired to mill the tenon at any angle to the axis of the buckets.

Milling these buckets from the solid is necessarily a more expensive operation than producing them on progressive dies, but General Electric's engineers point out that the number of different sizes involved would necessitate a very heavy die cost, the high degree of accuracy and fine finish could not be obtained with dies, and furthermore, stamping would introduce stresses which would be highly objectionable. Milling eliminates these difficulties, and the use of specially designed fixtures with standard machines has made it possible to put parts into production in much less time than would have been required to obtain special machines.

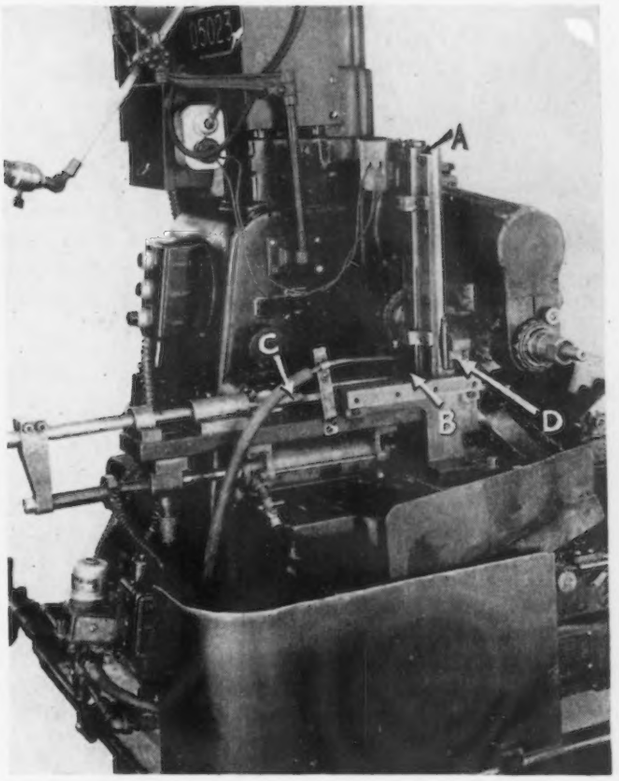

FIG. 2—Standard manufacturing-type mill equipped with magazine feed and special automatic fixture for machining tenon on buckets.

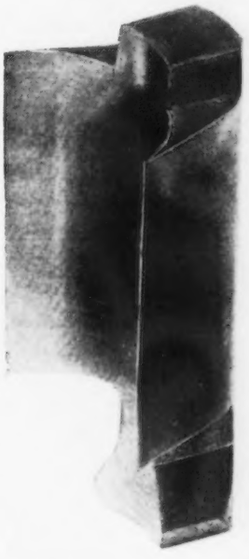

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FIG. 3—Turbine buckets, showing the dovetail and tenon milled on standard machines by means of special attachments.

Single-

By JOSEPH F. ALLEN
Project Engineer,
Warner & Swasey Co., Cleveland

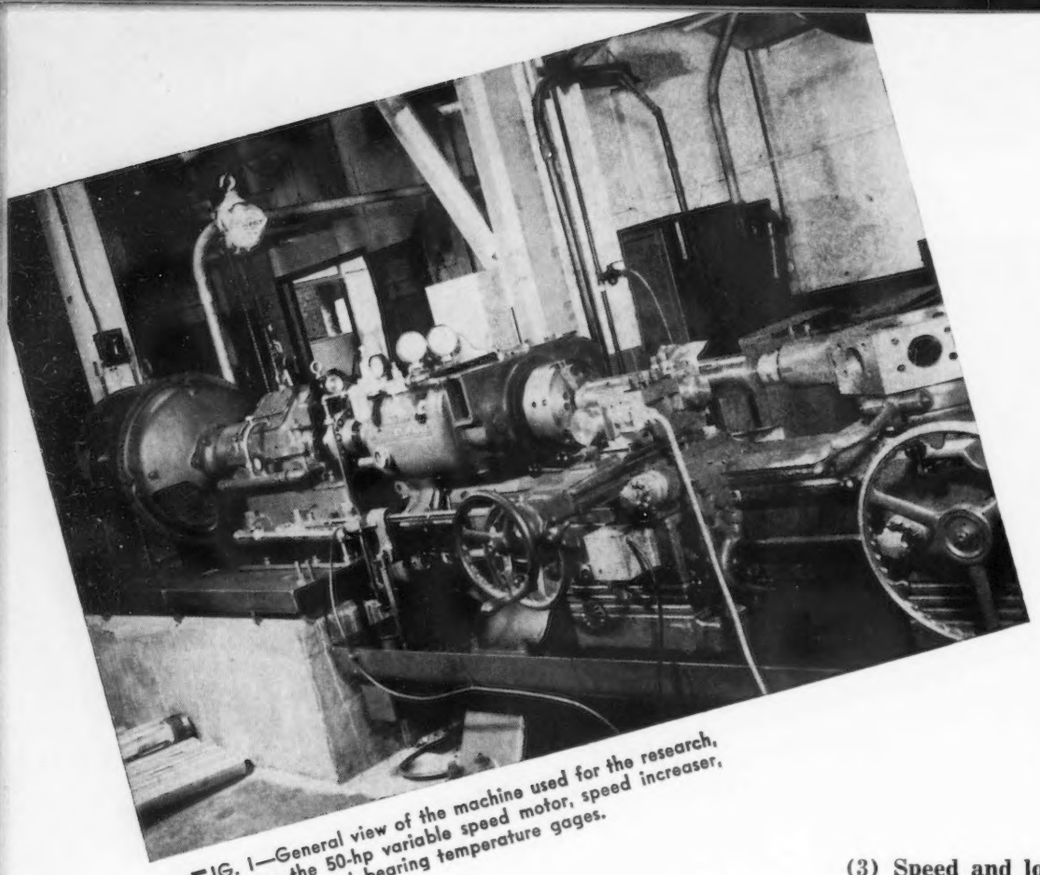

FIG. 1—General view of the machine used for the research, showing the 50-hp variable speed motor, speed increaser, and bearing temperature gages.

DURING the past year or two the wide publicity given to the use of negative rakes on carbide cutters, both in milling and in turning work, and the resultant increase in performance, has undoubtedly created in many minds the impression that all present-day machine tools are on the verge of complete obsolescence.

Obsolescence of present-day machine tools is highly desirable and is the objective of every machine tool development program. However, it is an objective that comes at a high price and only through the expenditure of much time and effort. The degree of obsolescence created by the appearance of new machine tools is usually not very high because of the many limiting factors concerned.

Cutter performance is only one of these many factors, and the development of new techniques with carbides, and the appearance of new cutting materials will exert an influence on machine tool design that is not nearly as immediate as might be supposed.

In the event that a new cutting material should suddenly appear that is 100 pct better than the existing cemented carbides, some of the factors that would have to be dealt with in the case of the turret lathe in order to attain the full utilization of this material would be as follows:

(1) Handling time; that is the time required for set-up, chucking of the workpiece and removal, positioning the cutters, engaging feed levers, changing speeds, pushing control buttons, etc.

(2) Motor limitations, such as the time required to start and stop, the frequency of reversals obtainable without overheating, etc.

(3) Speed and load limitations of bearings. This is especially acute on a turret lathe where a spindle must be large enough to allow bar stock to pass through.

(4) The effect of heat upon the alignment of the spindle with the bed ways and the consequent effect on accuracy of machining.

(5) The effect of unbalance of work pieces such as forgings or castings rotating at high speed.

(6) The application of a cutting compound to work rotating at high speed.

(7) Safety of personnel.

(8) Operator fatigue.

(9) Control of chip formation and disposal of chips.

(10) The cost of improvement as related to the gain in performance.

This does not mean that full utilization of the new material would not be realized in time; it does mean, however, that because of these numerous factors which must be considered, improvements are bound to be relatively slow.

In a type of machine tool where the limiting factors are not so numerous, the appearance of a new cutting technique or cutter material will have a much more immediate effect on machine tool design, and obsolescence of existing equipment will come more quickly. That is why the recent development of the use of negative rakes in milling almost immediately resulted in the appearance of new milling machines designed expressly for the milling of steel with carbides. The absence of such factors as workpiece unbalance, and inertia loads imposed on the drive motor by spindle reversals and speed changes had much to do with the quick and successful utilization of the new carbide techniques.

Although the immediate effect of improved cutter performance upon machine tool design may be relatively slight in some cases because of the complexity of the other factors involved, it is by no means to be

Point Turning Research . . .

The behavior of a single-point cutting tool depends on a great many factors, any one of which may exert a profound influence on the rate at which metal can be removed. In the first section of this two part article, originally presented before the ASME in Cincinnati, the author describes the special equipment used for determining the effects of cutter shape on the cutting force components, power requirements, cutter life, and surface finish.

considered unimportant. On the contrary, cutter performance is the one major factor that dominates all of the others in any machine tool that removes metal.

Everything about a machine tool represents an attempt to obtain the maximum utility which the cutter has to offer. The history of design shows that there is a continual effort on the part of the machine tool builder and the cutter manufacturer to keep pace with each other's development progress.

As a first step in an effort to learn exactly how the turret lathe compares in its productive capacity to the performance capacity of carbide cutters, an examination of Warner & Swasey sales records reveals the following:

(1) **Of the three sizes of turret lathes having bar capacities ranging from 1-in. diam to 1¾-in. diam, about 75 pct of those sold during the past year were ordered with two-speed motors which would provide increased horsepower and spindle speeds 100 pct above standard speed.**

(2) **However, of the five sizes of turret lathes having bar capacities ranging from 2½-in. diam to 9-in. diam, only about 10 pct of those sold in the past year were ordered with the higher ranges of speed and horsepower available, and most of these were for a 50 pct increase instead of 100 pct.**

It is not to be inferred that this low percentage bears any direct relation to the ratio between carbide performance and turret lathe capacity. Rather, it reflects the status of general machining practice.

Spot Surveys Made

Another step in the analysis of the situation was to learn as much as possible about general machining practice by making a spot survey in shops all over the country. In an effort to establish the trend, particular attention was paid to those jobs which were outstanding. All pertinent data were taken on any turning, boring or facing job where the rate of metal removal was observed to be unusually high, whether by heavy cuts at moderate speeds or light cuts at high speeds. Boring mill and engine lathe jobs were observed as well as turret lathe jobs.

In summing up the observations made, the following two conclusions were reached: First, turret

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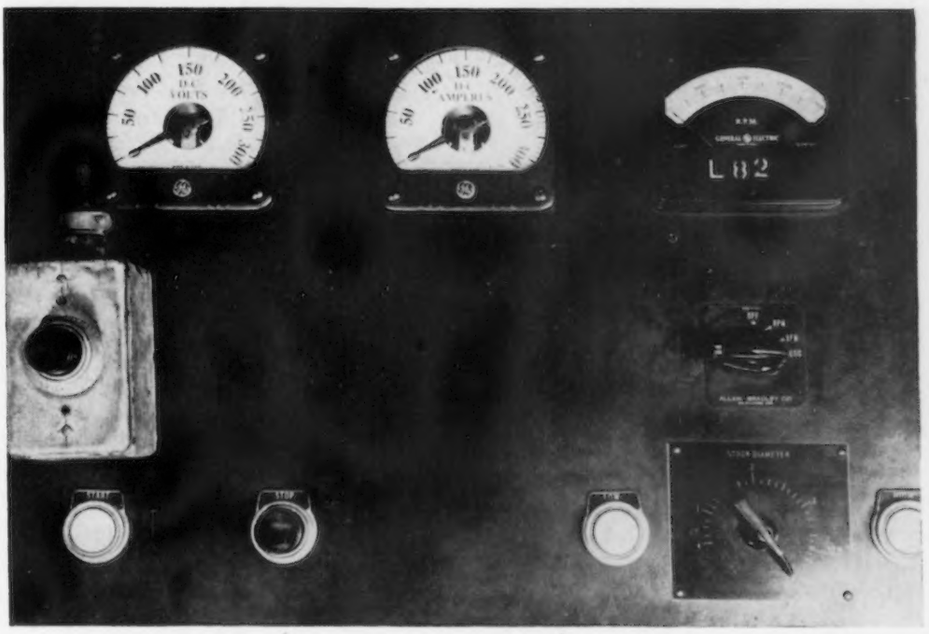

FIG. 2—Master control panel with drive motor voltmeter and ammeter, spindle speed indicator, cutting speed indicator, speed controls, master switch and emergency stop.

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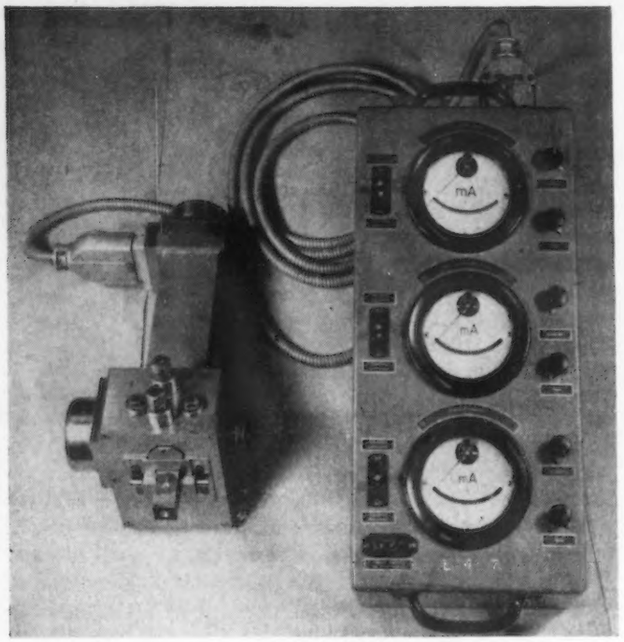


FIG. 3—Schiess-Defries cutting pressure dynamometer and instrument panel used for measuring the tangential, radial, and feed forces exerted on the tool when in operation.

lathe machining practice may be divided into three groups, as follows:

Group 1, where the machine is being pushed hard by the use of new carbides and techniques. In this group will usually be found small diameter work running at top speed of the machine, heavy cuts on large diameter forgings at moderate speeds but at maximum power, and the machining of light metals.

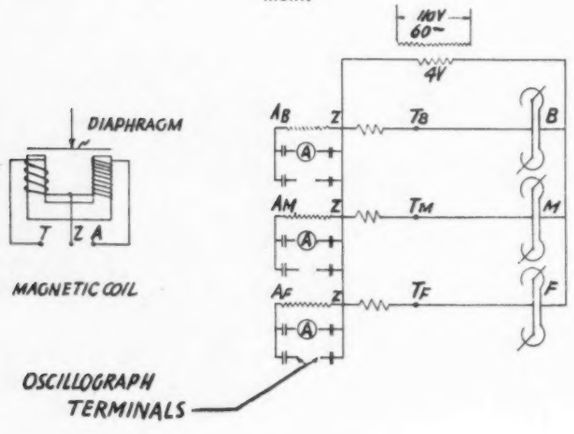
Group 2, where the limitations of carbide cutters are reached without utilizing the full capacity of the machine.

Group 3, where the full capacity of neither the machine nor the carbide cutters is being utilized.

Group 1 is the smallest of the three; group 2 is somewhat larger, but both of these are dwarfed by the relative size of group 3.

As a general observation, it may be stated that the productive capacity of the turret lathe has not begun to be realized by the great majority of its users, even under the pressure of war time.

FIG. 4—Schematic diagram of the element which detects cutter force, and wiring diagram for the complete instrument.



The second conclusion reached was that such a survey of outstanding performances on existing machines does not reveal more than a portion of the answer sought. The factors which control the production rate on a machine tool are almost always too numerous and sometimes too obscure to permit an accurate evaluation of cutter performance. Machine vibration, cutter overhang, heat treat and structure of material being cut, system of cutter supply, ease of cutter replacement, operator attitude and care in handling cutters, shape of cutter required for workpiece, coolant or cutting compound application, workpiece rigidity, presence of or lack of mill scale, all of these and many more factors offer pretty good assurance that every cutter application will be different even on similar cuts in a single shop. Comparisons, therefore, can be only general.

One thing was learned from this survey, and that is that the trend toward the use of higher speed and greater power is quite evident. The machine tool builder must heed this trend and provide for more power and speed in machine tools which he has under development. Unfortunately, the establishing of this trend does not answer for him the questions of how fast or how much power.

The answers to these questions can be obtained only through research, and it is for the purpose of obtaining these answers that the Warner & Swasey Co. has begun a program of research in metal cutting that reaches beyond the limitations of present-day turret lathes. The following is a description of the equipment that has been set up for this program and some of the methods involved.

Equipment and Methods

In order to reduce the possibility of running into speed and power limitations, a turret lathe having a normal top speed of 920 rpm and 15 hp was equipped with a spindle drive which will provide over 5000 rpm and 100 hp. By removing all gears and clutches from the head of the machine and driving the spindle by coupling it directly at its rear end to the motor drive, the variable conditions present in multiple gear trains and clutches were eliminated.

Fig. 1 shows a general view of the machine and drive.

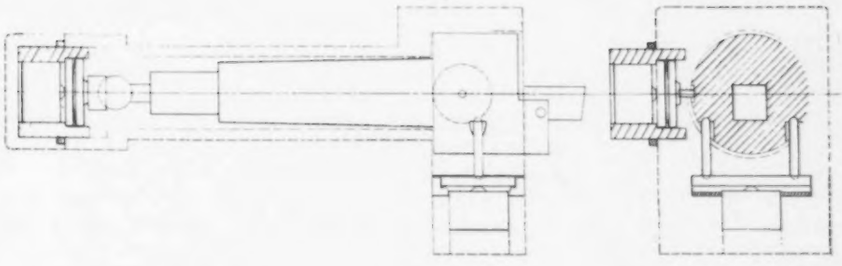
The foundation is an integral block of reinforced concrete 1½ ft thick under the lathe and 3½ ft thick under the motor.

The motor is a variable speed dc motor rated at 50 hp but is capable of delivering 100 hp for limited lengths of time. Its no load speed ranges from 11 rpm minimum to 1900 rpm max. Constant horsepower is delivered above 400 rpm and constant torque is delivered below that speed.

Dial thermometers on the head of the lathe indicate bearing temperatures of both front and rear spindles, and all rotating parts are in dynamic balance to eliminate machine vibration.

Motor speed is increased three times by driving through a speed increasing unit composed of a single pair of 10-in. wide herringbone gears lubricated with an oil spray. Oil is forced under pressure from a built-in pump to four plain babbit bearings, and

FIG. 5 — Sectioned drawing of the cutter holder showing the location and arrangement of the three force detecting elements.



is cooled by tap water running through coils in the sump. The coupling to the motor is of the type which will slip under excessive overloads, and the coupling to the spindle is of the gear tooth type. A tachometer generator driven from the output shaft of the speed increasing unit is connected to a calibrated voltmeter to provide continuous indication of spindle speed.

The spindle bearings are lubricated with a fog of oil which is obtained by atomizing 8 to 10 drops of oil per min for each bearing. Air pressure through the atomizers is maintained at 30 to 40 lb, the air passing through a filter system to eliminate moisture. The front bearing is somewhat special in that the roller cage is made of plastic to reduce the amount of heat generated, and the oil fog is delivered through holes in the outer race. The rear bearings are standard ball bearings with a light preload.

Fig. 2 shows a view of the master control panel. The voltmeter and ammeter indicate the drive-motor armature voltage and current. The meter at the upper right is connected to the tachometer generator previously mentioned and is calibrated to indicate spindle speed. With the dial at the lower right set to the diameter of stock being cut and the selector switch set to the sfm position, the meter will indicate cutting speed in surface feet per minute. The selector switch may also be used to connect the output of the tachometer generator to an oscillograph for recording the speed and any changes that might occur while cutting.

The spindle can be started and stopped, and increased or decreased in speed by pushing the buttons at the bottom of the panel.

The power supply includes a dynamic braking circuit which will bring the spindle to a stop in from 1 to 4 sec depending upon the speed at which it is being run.

The pendant push button on the left operates a solenoid which disengages the feed. This is used in case of emergency.

In attempting to determine the power required to cut metal, it is common practice to run a pony brake test on the spindle and to work from a calibration curve which indicates hp output at the cut for any power input to the motor. Knowing the power consumed at the cutter and the cutting speed, it is a simple matter to compute the tangential cutter force. This procedure was avoided in this case because of several reasons.

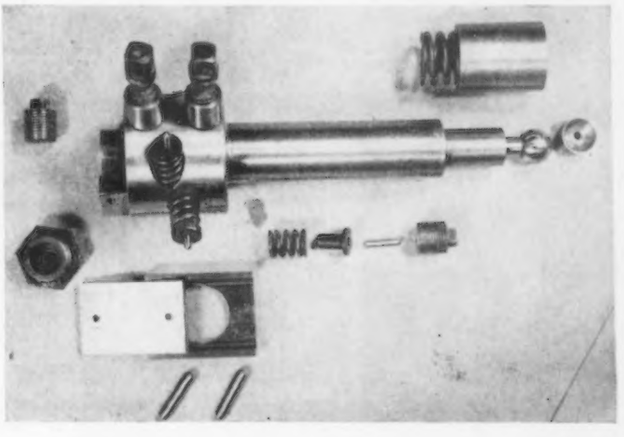
In the first place, it would require quite an elaborate pony brake setup to absorb 100 hp at the lower speeds and high torques, as well as at the upper speeds of several thousand rpm. In the second place, whereas one calibration curve will suffice for a single speed motor, a family of curves would be required for a motor operating at variable speeds to obtain acceptable accuracy. The original work involved and the interpolation continually required makes this procedure undesirable when a simpler method of determining power at the cut is possible.

Force Components Determined

Fig. 3 shows an instrument built by the Schiess-Defries Co. in Dusseldorf, Germany, and acquired by Warner & Swasey in 1937. By using this instrument, it is possible to determine the three components of force on a cutter. The tangential force can be used to determine accurately the power consumed at the cut without having to take into account the drive efficiency. The feeding force and radial or end force are also determined. From the standpoint of machine design, these data are highly desirable and can not be obtained by the motor calibration method.

The element which detects cutter force and the wiring diagram for the complete instrument is shown schematically in fig. 4. Two coils are wound on a common core, and one end of each is connected to terminal Z. With a power input supplied across terminals T-Z, there will be a power output across A-Z. The diaphragm serves to control the flux flow through the core by increasing or decreasing the air gap between it and the core. Any motion of the

FIG. 6—Disassembled view of the cutter holder showing the rectangular plate with knife edge supporting block and loading pins, load carrying plate preloading springs, and spherical seat for radial thrust indicator.



diaphragm toward the core will decrease the air gap and thus reduce the reluctance of the magnetic circuit. An increased flow of flux results, and the output of coil A-Z is thereby increased.

The rheostats shown in the wiring diagram are the coarse and fine adjustment for each circuit. These are adjusted so that at the no-load position of the diaphragm, the output of coils A-Z through the milliammeters registers 0.4 milliamperes. Any slight movement of the diaphragms resulting from a force on the cutter causes an increase in the meter readings. These meter readings referred to calibration tables give an indication of forces existing on the cutter. The output of coils A-Z may be switched through the additional terminals shown, to an oscillograph which will record the forces.

The arrangement of the coils in the cutter holder housing is shown in fig. 5. The cutter holder is supported against any downward force on two pins which bear on a rectangular steel plate. This plate is supported on two knife edges and will deflect under any load transmitted to it through the pins. The coil housing is directly below, and a button on the diaphragm bears against the center of the plate to detect any deflection under load imposed by the downward or tangential component of cutting force.

In a similar manner the radial component of cutting force is transmitted as a thrust against the spherical seat shown at the rear end of the cutter holder. The load in this case is borne by a steel disk 3/16-in. thick which is supported all around its edge. To load this disk at the center, an intermediate plate is provided with a slight spherically ground surface which contacts the face of the flat disk at the center only. A safety feature is also obtained in that under excessive deflection, a bearing will result over the entire surface and the intermediate plate will then take up a portion of the load. This would occur only under conditions of accidental overloads. The diaphragm button of the radial force coil can be seen bearing against the disk.

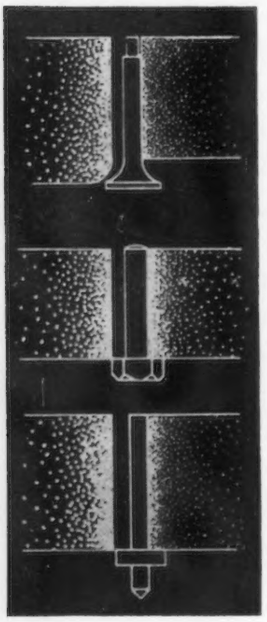
The construction of the feeding component measuring unit is identical with that of the radial component unit just described. The feeding component of force on the cutter is transmitted through a single pin to the loading plate, which then applies the force to the center of the deflecting disk.

In the final part of this article, to follow next week, the author completes the description of the equipment and discusses variables in cutter performance.—Ed.

Centerless Plunge-Grinding by Controlled Cycle

WHEN plunge grinding is performed by a centerless grinding machine in which the conventional method is for a partial turn to be given to the lead screw by means of a lever at the side of the machine, it is sometimes apt to be overlooked that the advance thus given to the wheel is only something less than 1/16 in. This relatively slight movement is quite adequate for the usual run of plunge-ground parts such as the valve, bolt, or shouldered pin as shown in fig. 1, but when deeply formed pieces or parts with a central collar have to be ground, these present difficulties in connection with the ejection after grinding. The problem is presented graphically in fig. 2, from which it will be seen that if the measurement B of a formed piece exceeds the amount of advance of the wheel A it is not possible to eject the finish-ground part from the centerless machine in the normal manner.

It is one of the advantages claimed for the new British made Scrivener centerless grinding machines embodying the patent "controlled cycle" method of op-



LEFT

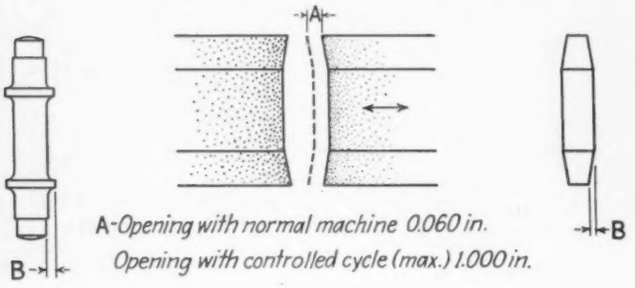
FIG. 1—Typical plunge-ground parts for which the slight movement of the wheels of a normal machine is adequate.

BELOW

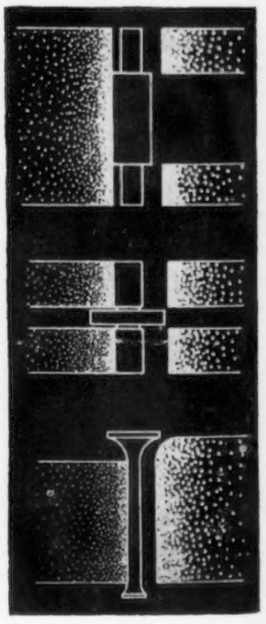
FIG. 2—As indicated in this diagram, the depth of form cannot exceed the advance of the wheel on a normal machine.

RIGHT

FIG. 3—Workpieces of the type shown here could not be ejected from a conventional type of centerless grinder.



A-Opening with normal machine 0.060 in.
Opening with controlled cycle (max.) 1.000 in.



eration that such deeply formed pieces can be ground and ejected automatically without the slightest difficulty. As the term is a new one in centerless grinding practice, it may be explained that plunge grinding by the controlled cycle implies that the advance of the control wheel and work on to the grinding wheel, the removal of a certain amount of stock at a predetermined rate, the ejection of the finish ground piece, and the opening up of the wheels for the reception of the next piece are all performed automatically without physical effort at any rate up to 1000 complete cycles per hr. The main advantage of a machine operating on this new system are (1) that it eliminates entirely the physical labor formerly involved in plunge grinding which is quite considerable, (2) it takes it out of the power of the unskilled operator to vary or force the rate of approach of the wheels or the rate of stock removal, thus greatly cutting down wheel wear, and (3) it permits of a very much wider wheel opening (up to 1 in.), thus making practicable the plunge grinding of deeply formed work of the type referred to in fig. 3.

The advance of the wheel and the rate of stock removal are controlled by means of a profiled cam plate and hydraulically operated slide built integral with the machine. Fig. 4 shows a detail view of this slide "a" with the cover removed. The forward movement of the cam "b" provides first for the quick approach of the wheels, then for the gradual and strictly controlled rate of stock removal, followed by a final dwell of the wheels, after which the cam makes its return stroke at twice its forward speed, operating the trip "c" of the ejector mechanism, and leaving the wheels open for the reception of the next piece. In fig. 5 the cycle is illustrated diagramatically.

The principle of the patented controlled cycle is now incorporated in both the No. 1 and 2 Scrivener machines, the latest model being available in three types, according to the duty for which the machine is intended. In the case of the normal controlled cycle type, the operator places the piece on the workplate and touches the operating lever, upon which the controlled cycle comes into operation and takes charge until the finish ground piece is ejected, and the machine comes to rest with wheels open ready for the next piece to be ground.

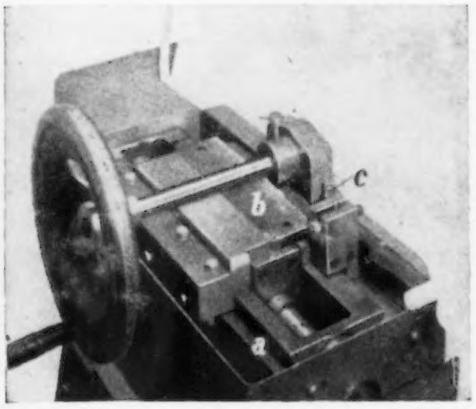


FIG. 4—Close up showing details of the slide which produces the controlled cycle movements of the wheel.

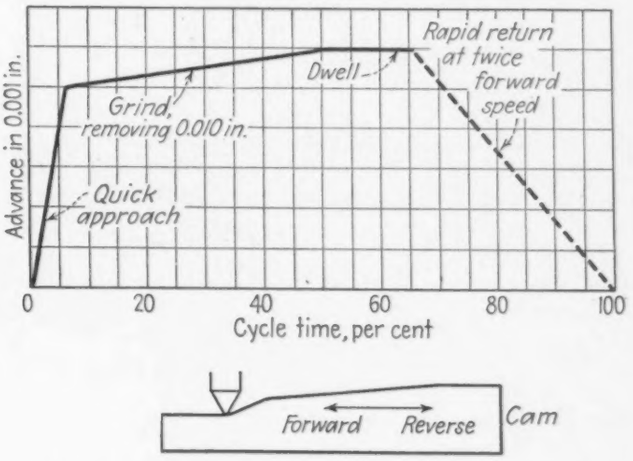


FIG. 5—Diagram showing the operation of the cycle of the plunge cut grinder.

The next controlled cycle auto type operates in conjunction with a hopper, and in this case the duty of the operator is merely to keep the hopper charged, the whole process of plunge grinding being then entirely automatic.

There is a further variation termed the controlled cycle manual type which is intended for unusual work where parts have to be ground having a widely varying amount of stock removal. With this design, the operator loads the piece, touches the lever to set the cycle in motion, and the operation is then automatic up to the point of completing the finish-grinding of the piece, after which he touches back the lever, the wheels open, the piece is ejected, and the machine is ready for loading the next piece. In other words, with this type the final dwell of the wheels on the work is under the control of the operator in order to provide for greatly varying stock removal.

▼ ▼ ▼

Machine Tool Lubrication

By P. E. BUNDY
Chemist, The Studebaker Corp., Aviation Div., Fort Wayne, Ind.

Frequently left in unskilled hands, machine tool lubrication may have far reaching effects upon machine life and operating costs. The importance of a properly integrated lubrication program is stressed herein, together with a system for reducing oil costs by periodic inspection and filtration.

WARTIME industry is emerging from a 4-yr battle against time and production schedules with an increased consciousness concerning the necessity of improved lubricating oils and adequate lubrication maintenance programs. The program described herein is that which has been in effect for about 3 yr in the plant of the Aviation Division of the Studebaker Corp. at Fort Wayne, Ind., and while not represented as being an ideal setup, does indicate that by a careful consideration of machine shop practice, by the testing of used oils, and by a study of lubrication costs it is possible to draw some valid conclusions concerning the desirability and practicability of certain lubrication practices and control procedures.

In setting up the lubrication program it was decided to accept the recommendations of the various machine tool builders, and 14 lubricating oils and 1 grease were stocked for regular use. The cost of the oil varied from 36c to 68.4c per gal, the average cost on the basis of consumption being about 48c per gal. The grease cost 10.5c per lb.

Prior to acceptance, all oils were inspected by the laboratory for identification and for the detection of contaminants. This inspection usually included tests for gravity, viscosity, flash point, neutralization number, and sediment, although any material which appeared doubtful was checked to the complete specification.

Although the machine repair department was directly responsible for machine tool lubrication, the entire program required the cooperation of the machine repair department, the various departmental foremen, and the laboratory. Oil changes were made at the request of a departmental foreman or at the discretion of an oiler, but only after the oil had been examined by the oil chemist and pronounced unfit for further use; in which case the chemist indicated the disposition of the used oil. Since there seems to be a tendency on the part of shop men to change oil every time a valve sticks or a belt breaks, it is believed that this practice accounted for a considerable saving in oil and labor. Laboratory examination of oils reduced the number of oil change requests and eliminated much guess work.

A permanent card record system proved to be invaluable. A card was attached to each machine, and a duplicate, filed by department, was kept by the machine repair clerk. By such an arrangement, the lubrication history of every machine was readily accessible. The permanent card file contained such information as type of oil used, dates changed or filtered, and reason for change or filtering. A separate record was also kept on oil consumption by departments and by specifications.

The original manufacturers' recommendations concerning hydraulic oils were apparently made in anticipation of severe service conditions and poor maintenance, and in most cases, called for a change every 6 to 12 months. The hydraulic machine systems at Studebaker required, for filling, about 12,000 gal of oil. To have made a complete change every 6 to 12 months would have been costly in oil and labor, and it seems questionable whether such a change would have improved lubrication to any appreciable extent. Periodic examinations were made, and on the basis of laboratory tests and the performance of the machines, the oils in most hydraulic systems were considered satisfactory lubricants after 3 yr service.

In order to prevent the accumulation of sludge,

and to remove some of the soluble oxidation products, the oil in nearly all of the hydraulic systems was filtered about every 6 months. The filtering process consisted of forcing the oil through fuller's earth, 30-60 mesh, at a temperature of 140° to 150°F. The filtering unit contained 150 lb of earth and had a maximum flow of 4 gpm. It was mounted on rollers and could be moved by one man. All reclaiming was done at the machine. If there was sludge accumulation in the reservoir of a hydraulic system, the oil was removed by filtering it into a clean container; the reservoir was cleaned, using a gum solvent flushing oil if necessary, and the same oil filtered back into the reservoir. The entire procedure required only one man and could be accomplished in about 30 min. If there was no evidence of sludge deposits, the oil was bypassed through the filtering unit for any length of time desired, permitting the machine to continue operation and eliminating down time.

The filtering program was conducted systematically by groups of machines. The oil in all machines using the same specification was filtered, after which the used fuller's earth was discarded, new earth put into the unit, and another group of machines, which were using a different grade of oil, was filtered. Some hydraulic oils are compounded with fatty oils, and although the filtration process removes some of the fats, the percentage was found to be relatively small, little, if any, being removed after approximately 0.7 gal of oil per lb of earth had passed through the filter.

Filtering did not remove the antioxidant used in the hydraulic oils to any appreciable extent. Samples of oil examined, by the supplier, after 3 yr service, and after four filterings, were found to contain 80 pct of the original amount of the stabilizing chemical. Make-up oil, of course, would tend to prevent depletion of the antioxidant. In the particular case referred to, make-up amounted to about 12 gal per yr in a 35 gal capacity reservoir.

Since the bulk of the oil used was in hydraulic systems, testing used oils consisted largely of making periodic surveys of the oil in these systems. The survey was conducted while the machines were in actual operation, and consisted of taking samples from the various types of machines and checking for certain physical and chemical properties. Observations were also made as to the condition of the reservoirs. When the most recent survey was made the oil in most of the systems had been in service 3 yr and had been filtered three or four times. These surveys served to indicate the general condition of the oil, and as a check on the maintenance responsibilities of foremen and oilers.

When the oil from a gear tooth grinder or a broach was found to be corrosive, this usually indicated that it had been contaminated by the corrosive oil used as a coolant, in which case the leak was stopped and the oil changed. When the neutralization number of an oil was found to be 1.00 or over, the oil was changed or filtered depending upon its other properties.

It was found that the change in physical and chemical properties of the oil used in surface grinders resulted largely from leakage from the ways, which were lubricated with a heavier, compounded oil. Although undesirable, this condition was not considered serious enough to warrant changing the oil in the hydraulic system.

Considerable difficulty was experienced in preventing the hydraulic oil in Mult-Au-Matics from becoming contaminated by the water soluble coolant used in these machines. This condition resulted in rather frequent changes and filtrations.

Lubrication costs vary widely from department to department depending on the number of machines in operation and the particular type of work being performed. Thus, for the blanking department, which had a total of 311 machines of various types, including drills, lathes, mills, broaches, grinders, tappers, Mult-Au-Matics, and boring mills, the cost per 1000 machine hours amounted to $4.98 for a year. For the gear grinding department, which had 94 machines, all gear tooth and spline grinders, the cost amounted to $15.075, while for the polishing department, with 49 lathes and 4 drills, costs were only $0.401. During this particular year 2866 gal of oil were used for changes, 324 gal for filling new machines, and 26,139 gal for make-up, squirt can application, and similar uses. The total cost of all oil and grease used in the plant amounted to $14,965.76 which, being distributed over 3,725,222 machine hours, resulted in a total plantwide cost of $4.02 per 1000 machine hr.

Periodic inspection therefore, combined with a well organized filtration program, can be expected to produce the following benefits:

(1) Clean oil. Filtration through fuller's earth is a refining process and will remove such contaminants as soluble and insoluble oxidation products and moisture. Used oil, therefore, is free of sediment, the neutralization number is lowered and the color improved.

(2) Reduced lubrication costs. Periodic filtration reduces the number of changes necessary. If every hydraulic system at the Studebaker plant had been changed annually, the cost of oil alone would have been approximately $6000.

(3) Low reclaiming costs. Filtering the oil as described is a simple process; the only equipment necessary is the filtering unit and a clean drum. A refill of fuller's earth costs about $15. The quantity of oil that can be filtered through the earth depends, of course, upon the nature and extent of the contaminants.

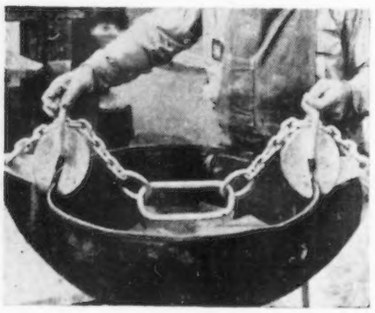
(4) No mixed oils. Filtering the oil at the machine in which it is being used, eliminates any possibility of mixing two or more oils of different specifications.

New Equipment . . .

Materials Handling

. . . In this week's issue are described interesting developments in load handling device, lift truck accessory, cylinder handling truck, dump body, magnesium alloy truck, boom attachment, welded lifting magnet, mobile boom crane, cushioning meter, industrial truck, brake control, and several other devices.

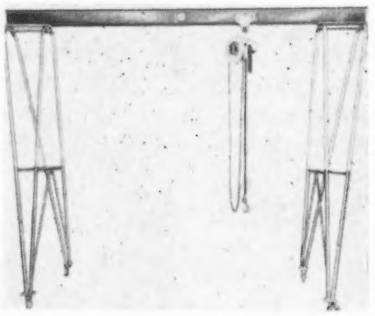
A CAM-LEVER mechanism and chain that grabs up heavily laden steel barrels, steel plate, etc., and holds it in a vice-like grip that grows tighter the heavier the load, has been announced by *The Boyer-Campbell Co., Safety Div.*, 6540 Antoine St., Detroit 2, and is to be known as "Granny Grip." This unit consists of two stamped alloy steel bodies and Herc alloy chain



that is capable of lifting any load that its ¾-in. jaws can be slipped over. It is said to be particularly designed to facilitate handling of material with industrial trucks and cranes, all around the plant and yard. This unit is quickly installed in a few sec.

Load Handling Device

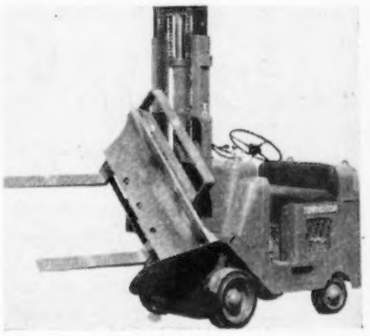
A MOBILE load handling device of 2000 lb capacity which provides a complete load handling unit that operates on the floor, has been announced by the *Shaw-Box Crane & Hoists Divs. of Manning, Maxwell & Moore, Inc.*, Muskegon, Mich. Outstanding advantages are said to be maximum rigidity with light weight—the complete assembly weighs but 270 lb, and it is arranged so that the entire space between the Gantry legs may be served because the inside faces of them are vertical their entire



height. The Gantry "A" Frame, as this device is called, is designed so that either a Chain Block or Electric Hoist suspended from an I-Beam Trolley may be employed as the hoisting unit. The unit is made available as a complete unit, or as an assembly which includes all parts to build this device except the I-Beam which may be obtained locally.

Lift Truck Accessory

A LIFT truck accessory, designed for the paper industry, but suitable for use in any handling operation requiring movement of cylindrical loads in either vertical or horizontal position has been announced by *Towmotor Corp.*, Cleveland. The Upender, as this lift truck is called, is designed to turn or "up-end" rolls of paper from vertical to horizontal position, or vice versa. It is said to provide speedy, safe carrying and stacking of rolls in whatever position is desired, with a minimum of effort. This accessory is said to be designed for simple operation and is constructed of steel bars and angles. It has two carriages: (1) a regular elevating carriage mounted on the mast and (2) a revolving, or upending carriage. In operation, the Upender blade slides under the roll of paper. By means of a lever on the hydraulic control valve, the carriage, is revolved, permitting the carrying of the roll in a horizontal



position. In stacking, the roll may be kept in the horizontal position or returned to a vertical position if desired.

Cylinder Handling Truck

ADDED to their line of Wheelrite two-wheel cylinder handling trucks, a Wheelrite No. 3, has been announced by *Weldrite Co., Inc.*, 29-23 40th Rd., Long Island City 1, N. Y. This truck is designed for transporting, safely and easily, individual tanks of any size from stock to job. The all-welded construction of sturdy angle-iron framework and tubular steel is said to take plenty of abuse and stand up under the most adverse shop and field conditions. Two larger size trucks, provide for car-

rying two of the largest size tanks of oxygen and acetylene, and two medium size tanks of oxygen and acetylene, respectively. Features include hefty one-piece tubular steel handles, all-welded angle-iron framework, large, wide-flanged, easy rolling steel wheels and rigid preformed steel platform.

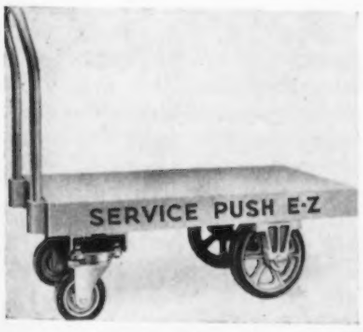
Dump Unit

THE Phillips Phil-Dump Jr., one of the many Phil-Dump Haulage Products of the *Phillips*

Mine & Mill Supply Co., Pittsburgh, has been announced for use with fork lift trucks. It has a one-half cu yd capacity with an overall length of 66 in., width 24½ in., and height 38¼ in., and is equipped with solid rubber tires for ease of operation and floor protection. This unit is invaluable in transporting and unloading scrap, castings, stampings, cuttings, sand, fertilizer, and powdered chemicals, and can also be used with all standard type fork lift trucks, and as a hand push model.

Magnesium Alloy Truck

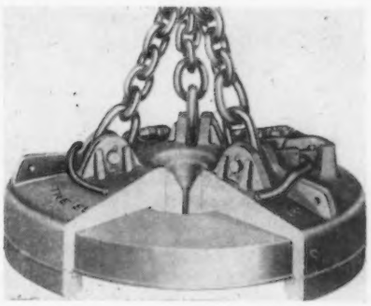
AN All-Magnesium alloy post-war truck has been announced by *Service Caster & Truck Div., of Domestic Industries, Inc.*, Albion,



Mich. Known as the Service Push-E-Z model with capacity of 6000 lb, it is claimed to have easier operation and to cause less physical fatigue.

Welded Lifting Magnet

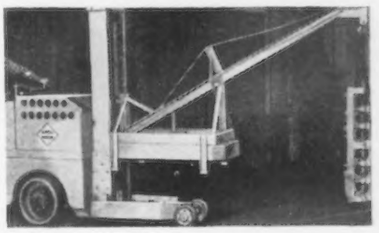
FOR general lifting magnet service, handling pig and scrap iron, slabs, castings and similar materials, the *Electric Controller & Mfg. Co.*, Cleveland, have announced the type of SW-All-Welded. Lifting Magnet. The all-welded, water-tight construction of the type SW magnet permits its safe use in any service and in under-water salvage work, also in cooling pits and other applications where moisture is excessive. Enclosing the coil in metal case before placing same in the magnet-housing is a radical departure from conventional practice. Different from previous construction, this type SW has its coil enclosed and hermetically sealed by continuous welds in a metal case. Welds are continuous along the inner and outer circumferences of the coil-case and magnet-housing. Inner and outer pole shoes are also welded in place to form a streamlined magnet with straight sides.



There is no overhang to catch on sides of railroad cars and the elimination of recesses in the side of the magnet for bolt heads permits a magnet of full diam throughout its depth. This allows wider interior space, permitting a coil of greater diam. The coil-case after welding, is vacuum-treated and filled with a new compound which is then baked until it polymerizes to a stable condition. This new thermo-setting compound is resilient and clings to metal, has high dielectric strength, will not melt under heat, and will not become brittle.

Boom Attachment

A SIMPLE, easily constructed boom attachment which enables a machine tool builder to use an Elwell-Parker high-lift platform truck for a wide range of intermediary transportation jobs, has been announced by the *Elwell-Parker Electric Co.*, Cleveland. Raw materials and light and medium-weight parts are transported in skid boxes by means of platform trucks. Weight of the individual loads vary from a few lb up to 3 tons or more. Many castings and parts for machine tools are of a size or shape not readily handled on skids or in skid boxes, and they must be transported to other buildings or to stations not reached by other equipment such as overhead traveling cranes. The machine tool



builder adapts his platform trucks to these loads by means of a detachable boom built from steel angles and rods. This improvised boom is said to give satisfactory service, the machine tool builder reporting that it has already saved many times its cost in time and manpower.

Mobile Boom Crane

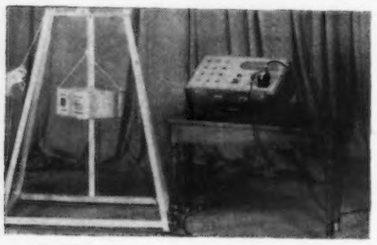
A POWERFUL Roustabout Crane, model MC-8, which handles loads to 10 tons, has been announced by the *Hughes-Keenan Co.*, Mansfield, Ohio. It is said to be a mobile full-swing boom crane, tractor mounted, that is easily driven where needed, and is especially adapted to use of long booms. It will handle loads of nearly 2 tons at a 30 ft radius, and 10 tons at 9 ft. Ball-bearing boom turntable and all gears and clutches run in

oil, fully enclosed. Boom swing and hoist and load hoist are all independent actions, with separate con-

trols and automatic brakes. This crane is claimed to be ideal for loading, unloading, moving or stacking heavy bulky objects, especially outside the range of big overhead cranes or where none are available.

Cushioning Meter

A CUSHIONING meter, offering a simple, rapid, and dependable means of determining the correct type, amount and distribution of cushioning material to protect any article in shipment has been announced by *General Electric's Meter & Instrument Div.*, West Lynn, Mass. This meter is said to apply scientific test methods to the evaluation of packing systems, and measures, in standard terms, the shock experienced by the object packed, thus checking the effectiveness of the packing system. This unit consists of a detector head and an indicator. The detector head contains an electric mechanism which responds in varying degrees to the shock it experiences. By providing standard measurements, this instrument supersedes such prac-



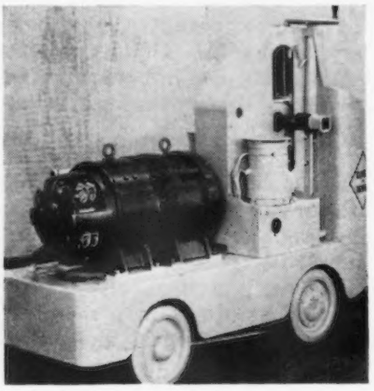
tices as rolling the package down a flight of stairs, tumbling it in a revolving drum, or shipping it over a test route. The indicator and power supply are housed in a carrying case with a hinged cover and a leather handle.

Hand-Operated Winch

A HAND-OPERATED winch weighing only 95 lb but rated at a 10,000 lb capacity, using 20-in. crank at a 70 lb crank load with a 27:1 reduction has been announced by *American Hoist & Derrick Co.*, St. Paul 1, Minn. Marketed under the name "Handiwinch," the winch is of all steel construction. Dimensions are 16½ in. x 15½ in. x 16¾ in. high. Oil holes are provided for the drum; otherwise self-lubricating bronze bushings are used throughout. The winch is said to have a 10,000 lb capacity using a 20-in. crank at a 70 lb crank load with a 27:1 reduction, or a 1900 lb capacity with a 4.5:1 reduction.

Industrial Truck

A POWER industrial truck has been announced by *Elwell-Parker Electric Co.*, Cleveland, to facilitate shipment of iron ore from the Lake Superior district to lower lake ports and blast furnaces. Instead of generating its own power,



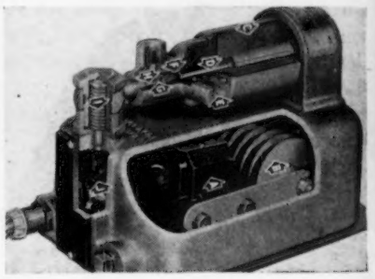
as by means of storage battery and motor, the truck obtains electricity from a supply line through a long flexible cable plugged into sockets spaced at regular intervals along vessel-loading docks. Motors on the truck provide power for maneuvering, also for rotating an adjustable wrench serving as a key to open and close bottom gates on iron ore hopper cars. These trucks differ radically in some respects from conventional types used to lift and transport loads on forks, platforms or cranes. One auxiliary motor operates the shaft which terminates in a sprocket and drives chains which turn the wrench. The other auxiliary motor is used to raise or lower the wrench in its guideway.

Skid Platforms

A COMPLETE line of skid platforms, deck pallets and nesting rings, made in all sizes for use with any type lift truck, has been announced by the *Phillips Mine & Mill Supply Co.*, Pittsburgh. This material handling equipment is claimed to be ruggedly constructed to withstand the punishment of continuous hard usage. The modern design of the pallet and skid products eliminates the use of nails, bolts and screws that tend to tear or score the load. The equipment is designated as "Phil-Skids" and "Phil-Pallets," with nesting rings available in corresponding sizes for ease in handling materials. The new line includes: (1) Phil-Skid Platforms, (2) Wood Deck Phil-Skids, (3) Double corrugated steel deck Phil-Pallets, for use with fork trucks, (4) Corrugated deck Phil-Pallets with pipe understructure, (5) Junior Phil-Skids, similar to the Wood-Deck Phil-Skid, and (6) Phillips Nesting Rings.

Brake Control Unit

DEVELOPED for the Wagner Type HM crane-bridge brake, a brake control unit has been announced by *Wagner Electric Corp.*, 6400 Plymouth Ave., St. Louis 14, to provide automatic cushioned emergency stops when power fails or crane runs beyond safe limits on the runway. This brake control unit permits free use of the foot controlled hydraulic brake for service stops while at the same time it holds the parking-brake setting-spring compressed and ready to apply the brake in an emergency, such as the over-running of a limit switch, power failure, or in the event the operator wishes to park the crane. The brake is automatically applied when the operator

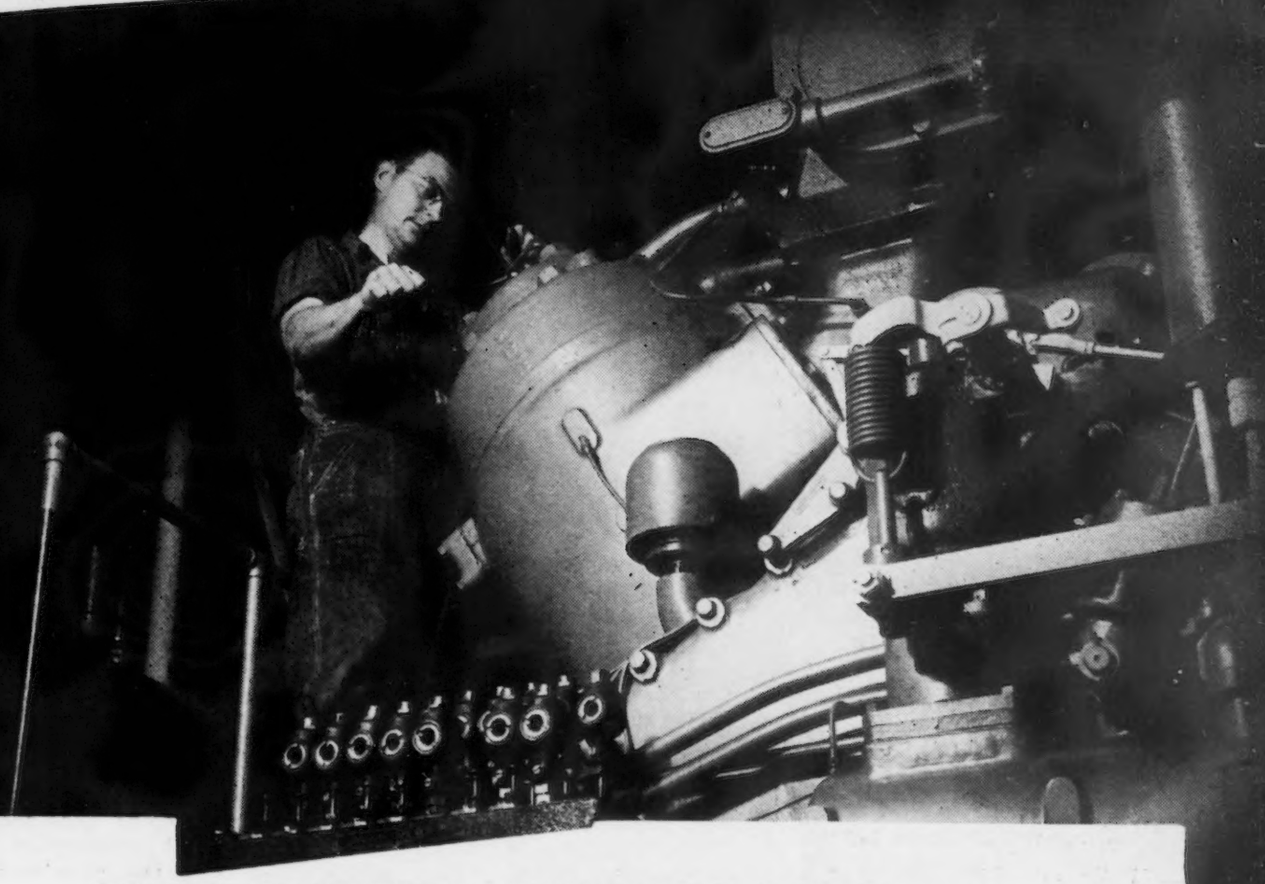


pulls the main line switch, which he does on taking the crane out of operation. To release the brake the operator merely makes a full application of the foot pedal.

Attachment for Fork Trucks

THE engineering department of *The Mercury Mfg. Co.*, 4144 S. Halsted St., Chicago 9, has announced an attachment for Mercury Hydraulic Fork Trucks, which makes it possible for the operator of the truck to dump automatically the contents of a box skid while the load is in a raised position. The box skids used are of a special hinged bottom design. Illustration shows how loops welded to the box are engaged by hooks on top of movable uprights of truck and cause bottom of box to fall away when forks are lowered. Attachments welded to the uprights of the trucks enable the operator to trip the load at any height.

20,010 HOURS OF TROUBLE-FREE OPERATION



SUN DIESEL LUBRICANT . . .

Keeps big Diesel-driven compressors running smoothly

Twenty-four hours a day . . . 20,010 hours of almost continuous work . . . no time-out for any but routine maintenance . . . and no apparent wear. That's the record of these four, big, Diesel-driven air-compressors, lubricated with Sun Solnus Oils.

Installed in a huge industrial plant, one week before Pearl Harbor, these 400-h.p. units have given outstanding service. Sun Solnus Oil was used for both Diesel power and air-compressor sides from the very first day . . . was chosen for its low carbon-content . . . its ability to keep rings free and clean . . . the fact that it doesn't form harmful acids or hard, flinty deposits . . . and doesn't break down into thick, sticky sludge.

This record is the kind which Sun industrial products are helping to hang up in hundreds of different plants . . . the kind of record that means continuous production . . . low operating-costs . . . a minimum of time-out . . . reduced labor costs.

Sun products prolong machine-life; save power, materials, and labor; not only in power-plants and factories, large and small, but throughout industry.

The telephone on your desk is a direct wire to the Sun Engineers and service men in your area. Call them in today.

SUN OIL COMPANY • ***Philadelphia 3, Pa.***

Sponsors of the Sunoco News-Voice of the Air—Lowell Thomas

SECRETS OF PETROLEUM SCIENCE REVEALED

At Booth E-605, National Metal Congress, February 4th to 8th. Complete exhibit of making of petroleum products—producing, refining, transportation, and industrial application. Don't miss it!

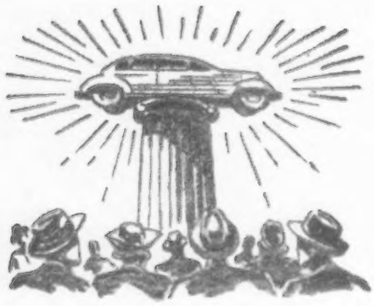
SUN INDUSTRIAL PRODUCTS

OILS FOR AMERICAN INDUSTRY

Assembly Line . . .

STANLEY H. BRAMS

• Production planning and techniques feature the first peacetime session of SAE in years . . . Advanced thinking on new vehicles promises real change in years ahead.



DETROIT—It was old home week in Detroit starting Monday, with the Society of Automotive Engineers meeting in its first national peacetime session since 1941. And it was the first time in an even longer period that the emphasis of this significant technical convention was on peacetime production rather than armaments. As a result, the earthy atmosphere of a real work session hovers over the various section meetings going on all this week.

Tuesday saw the session looking into a big crystal ball provided by a number of feet-on-the-ground authorities. The experts who did the talking, for the most part, are in no wise dreamers, but their thinking is definitely advanced.

For instance, L. H. Smith of General American Aerocoach Co., Chicago, said that motor buses of the future would contain pressurized, air-conditioned passenger compartments, individual radio sets, circulating ice water, retiring room, inside destination signs, polaroid windows, turbine electric drives, and speed up to 100 mph on suitable highways. He suggested that atomic energy ultimately might be used for propulsion. This motor bus of the future would include power steering, hydraulically operated doors, electric window defrosting, individual draft control and other features. He estimated that fares would be somewhere around 1½¢ a mile, even with all these de luxe advantages thrown in.

Mac Short, of Lockhead Aircraft Corp., and W. E. Miller, consulting engineer, both of Burbank, Calif., urged that aircraft design and construction techniques developed in the aircraft industry be applied to motor vehicles to reduce weight, improve structure and provide other advantages.

They brought out the often-expressed opinion that it is hardly good engineering to build up 3000 lb of material to carry one or two people. They expressed the opinion that motor vehicle practice of mounting a heavy body atop a heavy chassis structure does not make fully efficient use of materials and structures.

For one thing, they suggested that aluminum alloy sheet and castings customarily utilized in aircraft could be employed for secondary body parts and hardware. Engine hoods and compartment lids were cited as practical applications. Suggestion was made that the big bumper assemblies characteristic of the 1946 models, now weighing up to 100 lb, could be replaced by formed dual sections weighing only half as much.

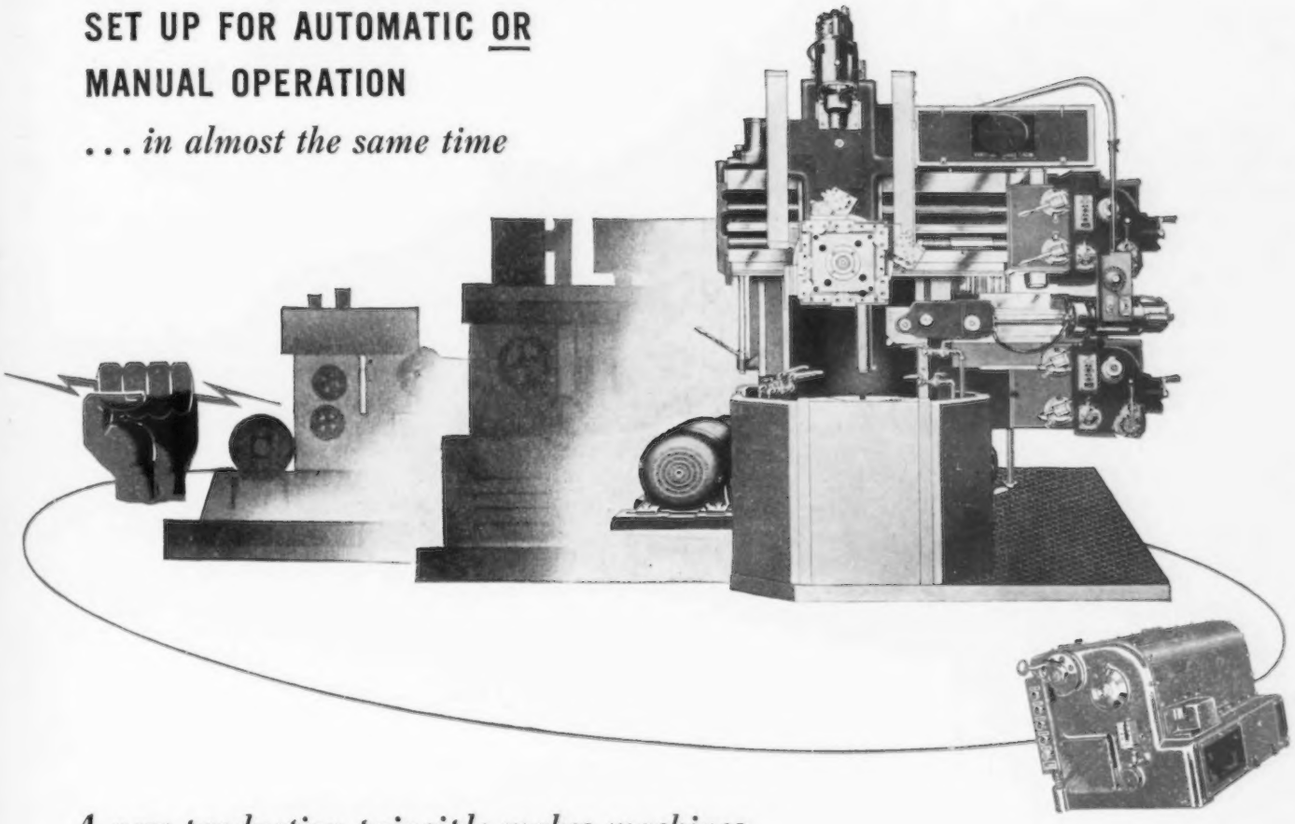
THESE cars and vehicles of the future, according to information outlined by Herbert S. Fairbank of the Public Road Administration, will travel on a network of highways which is really out of the Sunday supplements. Future highway plans, he said, call for arterial thoroughways instead of by-passes to serve both intercity and local traffic, 224- to 300-ft rights of way, shoulders sufficiently wide to accommodate halted vehicles, flat slopes on wide embankments for safety, and extended sight distances for higher travel speeds. The plans further were said to call for lane widths standardized at 12 ft, and for two lanes on highways serving less than 2000 vehicles daily, four lanes where traffic reaches 3000 to 15,000 vehicles daily, and six lanes where traffic is heavier. Other provisions were said to include minimum height clearances of 14 ft, avoidance of traffic signals and other causes for stopping, and pavement sufficient to support axle loads up to 18,000 lb.

Something nearer than projections in the future was hinted in the discussion of producing by 1947 a rear-engine passenger car possessing the economy of small models and the roominess of large vehicles. That this may be far more tangible than star-gazing is indicated because the speaker was William B. Stout, who is supposed to be developing a vehicle of that

STRICTLY POSTWAR: *First of two newly designed buses built by ACF-Brill Motors Co. for the Vermont Transit Co., Burlington, Vt. The body, framing and sub-structure are built almost entirely of aluminum which has reduced the total vehicle weight considerably. Passenger seating capacity is 37.*

NOW... ONE MACHINE CAN BE SET UP FOR AUTOMATIC OR MANUAL OPERATION

... in almost the same time



A new production principle makes machines yield richer returns on investment

The Bullard MAN-AU-TROL principle of automaticity gives a machine the ability to be changed from manual operation on single pieces or small job lots . . . to automatic production runs . . . in only slightly more time than required for changing the setup of a manually-operated machine . . . To illustrate, picture the operation of a Bullard MAN-AU-TROL Vertical Turret Lathe. Suppose a sample is to be machined for approval before a long run is started. As the operator does the first piece with the machine under manual control, he makes a simple MAN-AU-TROL setting at the end of each function. The job is completed in only a slightly longer time than if no settings were made. When approval is obtained, the operator then moves a single lever and operation becomes 100% automatic. Now, in between schedules of production runs, he can cut out automatic operation and use the machine for hand operation on miscellaneous jobs . . . This revolutionary machine versatility which prevents a machine from ever being idle is due to the fact that MAN-AU-TROL merely takes over whenever the manual operator wills, without disturbing the machine's inherent versatility. MAN-AU-TROL is now being applied only to Bullard machines.

The Bullard Company, Bridgeport 2, Connecticut.

BULLARD

MAN-AU-TROL

MASTER OF THE MACHINE

The automatic control that is as versatile as manual control

100% automaticity . . . 100% versatility . . . no human or cumulative error . . . control to the closest tolerances . . . a tremendous cost advantage in competitive markets.

sort for Graham-Paige and Kaiser-Frazer.

He told a passenger car body session that such a vehicle could have interior floor space of 6½ ft wide and 11½ ft long, accommodating comfortable lounging chairs, couch or bed, and table. He proposed that the body be made of glass or equivalent fiber plastic. On the mechanical side, he suggested a removable engine equipped with sleeve, slide or cuff valves and improved connecting rods, bearings and crankshafts. This description fits pretty well with that of the small Skinner engine being built by Jack & Heintz Co., Cleveland, and popularly tied to Kaiser-Frazer in the recent past (THE IRON AGE, Oct. 18, 1945, p. 76). Mr. Stout also talked about better heat and sound insulation in this supposedly hypothetical car, greater economy, lighter weight and lower costs.

ANOTHER hint in the direction of rear-engine cars came from H. E. Churchill, P. G. Hykes and M. Z. Delp of Studebaker Corp., in an outline of the fundamentals of suspension. "It is quite probable," they predicted, "that a major rearrangement or redesign of the heavier components of the cars not too far away."

They reported that modern design trends have been toward moving passenger car seats closer to the vehicle's center of gravity, which itself is being lowered, and predicted flatly that continuation of this trend might necessitate rear-mounting of engines to gain the necessary space for seats.

They said that further improvement of passenger comfort may be expected, but warned that continuing unbalance of front and rear-end weights, with front-end loads showing a pronounced tendency to increase, would complicate present and prospective problems of braking, steering and vehicle behavior on rough roads and turns.

SAE Elects Buckendale President at Annual Meeting in Detroit

Detroit

• • • **Election of L. Ray Buckendale,** of Detroit, as 1946 president of the Society of Automotive Engineers was announced at the business session of the SAE Annual Meeting. Mr. Buckendale, who is engineering vice-president of Timken-Detroit Axle Co., succeeds retiring SAE President James M. Crawford.

L. R. Buckendale

Eleven new SAE vice-presidents also were elected. They are:

Aircraft Engineering, G. A. Page, Jr., Director of Engineering, Curtiss-Wright Corp., Buffalo; Aircraft Powerplant Engineering, Earle A. Ryder, consulting engineer, Pratt & Whitney Aircraft, East Hartford, Conn.; Air Transport Engineering, Charles Froesch, chief engineer, Eastern Air Lines, New York; Diesel Engine Engineering, H. S. Manwaring, chief engineer, Truck Research & Development Div., International Harvester Co., Chicago; Fuels & Lubricants Engineering, J. C. Geniesse, process supervisor, Research & Development Dept., The Atlantic Refining Co., Philadelphia.

Also, Passenger Car Engineering, J. E. Hale, chief engineer, The Firestone Tire & Rubber Co., Akron, Ohio; Passenger Car Body Engineering, Thomas L. Hibbard, assistant director, Design Dept., Ford Motor Co., Detroit; Production Engineering, Neil A. Moore, vice-president, Sealed Power Corp., Muskegon, Mich.; Tractor & Farm Machinery Engineering, E. A. Petersen, chief engineer, Tractor Div., Massey-Harris Co., Racine, Wis.; Transportation & Maintenance Engineering, Ervin N. Hatch, senior automotive mechanical engineer, New York City Transit System, New York; Truck & Bus Engineering, Beverly W. Keese, engineering vice-president, Wisconsin Axle Div., Timken-Detroit Axle Co., Oshkosh, Wis.

New members of SAE Council are: A. E. Raymond, engineering vice-president, Douglas Aircraft Co., Santa Monica, Calif.; A. J. Blackwood, assistant director, Esso Laboratories, Standard Oil Development Co., Elizabeth, N. J.; and C. E. Frudden, consulting engineer, Tractor Div., Allis-Chalmers Mfg. Co., Milwaukee.

SAE Past President Mac Short, vice-president, Lockheed Aircraft Corp., Burbank, Calif., was elected life member.

HERE THEY COME: *New Studebakers are once more rolling off the assembly line after a 13-week delay caused by a labor dispute in the plant of a major parts supplier. A new innovation, flush-floor plates to convey the cars, insures greater safety for workmen.*

Iran Rolling Stock Sold

Washington

• • • **Foreign Liquidation** Commissioner Thomas B. McCabe has announced the sale to UNRRA of surplus railroad equipment located in Iran for use in China. Costing $8,128,106 originally, the equipment was sold for $5,958,916.

Included in the transaction were 20 oil burning locomotives, 1548 gondolas, 1370 box cars, 499 flat cars, 24 twenty-ton cabooses, 8 ballast cars and 42,800 ft of 75 lb rail. All the locomotives and 50 pct of all other items of equipment are being sent to Shanghai, while the remainder is being shipped to the Hong Kong-Kowloon area.

FOR SUCCESSFUL ALL-POSITION A.C. WELDING OF HIGH TENSILE-STEELS

USE THESE HIGH-QUALITY HEAVILY-COATED RACO ELECTRODES

RACO 7011 for carbon-molybdenum steel piping, structural silicon steels and similar steels with 55,000 psi yield point.

RACO 8011 for lower carbon grades of low-alloy structural steels —such as Man-Ten and N-A-X High-Tensile.

RACO 9011 for medium carbon steels and for steels with low alloy content such as A.S.T.M.—A212.

RACO 10011 for high-tensile steels in the vicinity of 100,000 psi, such as 2½% and 3½% nickel steels, SAE 6120, SAE 4340 and 0.50% carbon steel.

These new low-alloy steel electrodes conform to Specification A233-45 T of the American Welding Society as follows:

A.W.S.—A.S.T.M. Classification	Reid-Avery Grade	Min. Tensile Strength of Deposited Metal (stress relieved)
E-7011	Raco 7011	70,000 psi
E-8011	Raco 8011	80,000 psi
E-9011	Raco 9011	90,000 psi
E-10011	Raco 10011	100,000 psi

These electrodes are designed for all-position welding with alternating current. Direct current reversed polarity also may be used with equal success. The electrodes are available in sizes from 3/32" to 5/16".

Our twenty-five years experience in the application of skilled craftsmanship to highest quality materials is your guarantee of highest quality product.

The REID-AVERY COMPANY
INCORPORATED
DUNDALK BALTIMORE 22 MARYLAND
Since 1919 Producers of ARC Welding Electrodes and Welding Rods

Washington . . . L. W. MOFFETT

• FEA estimates postwar German steel consumption at 5 million tons annually . . . Machinery, tools, iron and steel products at prewar levels.

WASHINGTON — Germany will require no more than 5 million metric tons of ingot steel annually for postwar consumption, according to a report prepared by the Foreign Economic Administration. This estimate includes sufficient steel for new peacetime industries in a self-supporting Germany.

Three determinations were made in arriving at these requirements: (1) Estimate of per capita consumption equal to that of other European countries except Russia and the United Kingdom; (2) quantities required for replacement of capital equipment and consumer goods for a peacetime economy were determined on the basis of relationships of steel consumption on the one hand and investments in capital goods and production of consumer goods on the other; (3) estimates of specific finished steel requirements.

In the absence of data on present or future potential capacities of the European steel industry, the report points out that, despite increases during war years, capacity is now less than prewar years due to bomb damage, depreciation and lack of repairs. Accordingly, German postwar requirements for steel are not likely to reach or exceed during the next few years the prewar consumption of steel per capita of other European countries.

Per capita consumption in non-Allied European countries during prewar years (1928-1937) showed narrow variations due primarily to business fluctuations. However, the report points out, consumption of steel in Germany after 1932 showed an extraordinary acceleration out of proportion with the rest of the Continent. While the average per capita consumption (exclusive of Germany, United Kingdom and Russia) increased approximately 26 pct from 1933 to 1937, Germany's consumption nearly quadrupled.

Should Germany be permitted ingot steel production and consumption on the Continental average, based on an estimated German population of 65 million, approximately 5,070,000 metric tons annual ingot production would be involved.

In analyzing capital expansion and steel production in Germany, the FEA report points out that the rebuilding of a large section of Germany's industrial capacity in the 1920's, including the iron and steel mills, required far larger quantities of iron and steel than would otherwise be required to meet normal domestic demands and a legitimate volume of exports. Much of the basic industrial capacity needed for Germany's World War II effort was constructed by 1930.

During the 1920's exports were swollen by payment of reparations but a lull came around 1928.

Replacement demands for iron and steel during this rebuilding period was by no means as large as the quantity required for new construction. Only 10 pct of the total steel available was required for the consumer market in 1928, the report states, according to an authoritative German source.

After 1933 when rearmament began, the direct and indirect demands for steel needed for military programs required allocations of steel even though finished steel production capacity had more than tripled. In the absence of any prewar period which would constitute a yardstick appropriate for Germany's postwar economy, the report therefore selects 1932—the lowest production year—as the basis for computing German steel consumption involving capital improvements, consumer industries, machinery exports and iron and steelware manufacturing.

Because of the close relationship between steel consumption and capital investment, the report declares, it can be concluded that an increase of 10 pct should be applied to quantities of finished steel available for consumption in 1932, or 3,679,000 metric tons, in order to provide for all necessary replacements. This 10 pct increase, it is pointed out, also makes available for consumer goods production the same amount of steel as was used on the average from 1928 to 1934. The quantity of steel thus provided would be 4,047,000 metric tons of finished and semifinished steel having a corresponding ingot weight of 5,120,000 metric tons.

No special allowances are made for postwar reconstruction since there are available in Germany proper considerable quantities of structural steel which can be used for such purposes. Moreover, the report states, sufficient quantities will remain after removal of production equipment for reparations and disarmament purposes. It is also pointed out that German requirements may not approach production limitations set in the report with the result that there may be some surplus steel capacity.

German railroads will require 700,000 metric tons for maintenance of rail beds and rolling stock, according to FEA estimates. Although in 1934 German railroads required 1,000,000 metric tons of steel for maintenance purposes, postwar estimates have been adjusted downward because of anticipated shortening of lines and diminished activity.

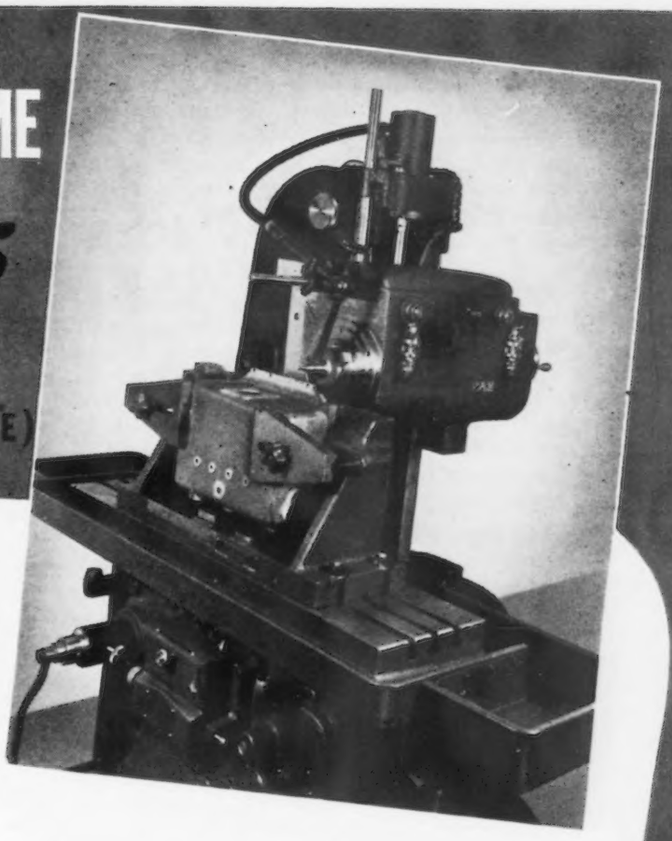
Although data are not available on prewar steel construction requirements, it is estimated that 773,000 metric tons will be needed. This estimate is based primarily on a comparison of cement requirements which in the United States is 0.2 ton of steel per ton of cement. No adjustment is made for a possibly lower steel-cement ratio nor is any provision made for inclusion of scrap steel supplies.

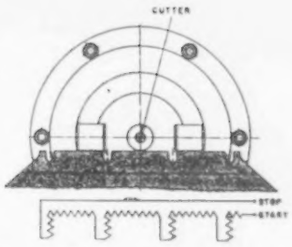
Germany's postwar finished

FLOOR TO FLOOR TIME

87 SECONDS

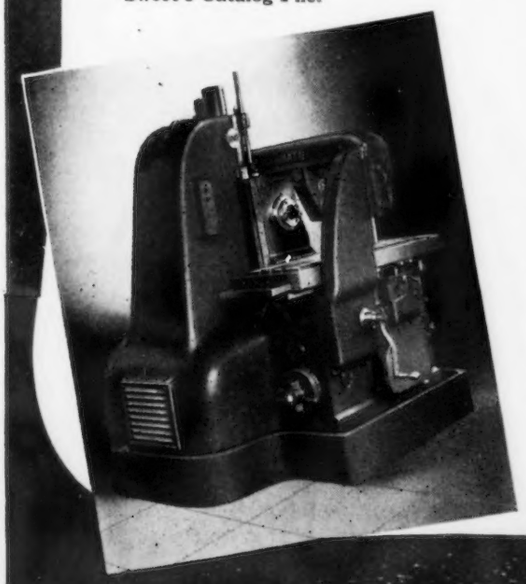
(MILLING FOUR SLOTS ONE AT A TIME)





Sketch of part and operating cycle
Part name: Rear Oil Sump
Material: Magnesium Alloy
Speed: 3600 RPM
Feed: 10" per minute
Production: 36 per hour

CINCINNATI No. 2-24 Automatic Rise and Fall Milling Machine. Catalog M-909-2 contains complete specifications. For a brief description, look in Sweet's Catalog File.



Every 87 seconds four slots are milled, one at a time, in oil sump casting . . . that's the production record on the job illustrated above. ¶ The machine is a standard CINCINNATI No. 2-24 Automatic Rise and Fall Miller equipped with a special raised headstock; single speed cam type spindle carrier with 2 hp motor, and special cycle selector. A single station hand-clamping fixture is used. ¶ Rise and fall of the spindle carrier is synchronized with table movement to make the entire operation automatic. After loading the fixture the operator simply flips the starting lever and the automatic cycle takes over, completing the milling operation and returning the table to starting position. ¶ Thus, with some tailoring on a standard machine, another milling problem is solved by Cincinnati Application Engineers. It's very probable that these engineers will be able to work out a more accurate, economical and productive method of handling some of your milling operations. Why not talk it over with them?

CINCINNATI

THE CINCINNATI MILLING MACHINE CO

steel requirements for production of machinery, equipment and boilers are estimated at 600,000 metric tons annually. This is computed on the basis that finished steel accounts for approximately half the weight of finished machinery, the balance being cast iron. This, of course, is on an industrywide basis. Postwar requirements of textile, papermaking, leatherworking, canning and packing machinery represent an average of production in 1928, a boom year, and 1933, a year of low activity. Production figures for 1933 were used in calculating requirements for heavy machinery, including prime movers, compressors, pumps, conveying machines, crushers, ore-dressing machines, valves and fittings, because of high war producing potential of that segment of German industry.

Postwar steel requirements for locomotives, steel mill and foundry machinery, chemical machinery, electrical machinery and boilers have been set to meet the machinery needs of the pertinent industries operating at levels prescribed in the overall disarmament program. The same is true of machine tools.

It is assumed that machinery exports may amount to 25 pct of Germany's production. In the event that such is the case, the report states, 150,000 metric tons of steel will be required for such exports compared with 450,000 metric tons for domestic use.

It is also estimated that 292,000 metric tons of finished and semi-finished steel products will be needed annually for the mines, quarries and lumber industries of postwar Germany. The mining industry, which requires 270,000 metric tons, is by far the largest user. This is attributed to the fact that the use of mine timbers entails higher costs than steel supports which can be used for a considerable time.

Annual steel requirements for production of iron and steel wares is estimated at 1,300,000 metric tons, of which approximately 1,140,000 metric tons are needed to meet domestic demands; the balance to be exported. These estimates, the report points out, are based on Germany's requirements pattern during 1933 and 1934 and give due consideration to economies in steel use which have been developed during the war. Actual data on German steel ware consumption are not yet available for any year after 1928. However, it is and steelware manufacturing in the 4-yr period ending 1933 were 5,339,000 metric tons.
the four-year period ending 1933 were 5,339,000 metric tons.

During German rearmament, the Germans produced many iron and steel items at lower piece weights without interfering with quality. Savings were realized through standardizations, weight ceilings, substitutions and in some cases prohibited uses.

These wartime measures taught the feasibility of using substitutes for iron and steel that probably will be continued in many cases in the postwar period. The tendency to adopt wartime iron and steel saving practices in the postwar period, it is stated, will undoubtedly be accentuated by any restrictions on the amount of iron and steel the Germans are allowed to produce. For example, during the war the maximum permitted weight of kitchen sinks and washbasins was 36 lb. The prewar standard weight was on the average much larger. Similarly weight restrictions were set on doors, frames, gates and other products. Since such reduction in the amount of iron and steel to be used were found practical, there is little reason to expect that manufacturers will return to the old practices when unlimited supplies of the materials will not be available.

During 1936, the last year for which data are available, Germany exported about 12.5 pct of all the iron and steel produced in the country. Application of this ratio to the proposed postwar output would give roughly 160,000 tons for export purposes.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

I THINK THAT HE WEARS THEM TINTED GLASSES SO TH' BOSS CAN'T TELL WHEN HE'S TAKIN' A NAP-- IT'S HARD TO TELL, AIN'T IT?
WELL, IT WOULD BE HARD TO PROVE EVEN YET-- ALL THEY COULD ACCUSE HIM OF IS USIN' HIS PANTS FER A CHAIR!
1-11 J.R.WILLIAMS
THE DAY BED
COPR. 1946 BY NEA SERVICE, INC. T. M. REG. U. S. PAT. OFF.

Drops Tin Price Control

Washington

• • • **Sales of pig tin** for export by the RFC Office of Metals Reserve have been exempted from price control by OPA.

Exporters hereafter are to base their selling prices upon the cost of acquisition of the metal from Metals Reserve.

The ceiling price for pig tin, Grade A is 52¢ per lb plus allowable charges for packing, transportation, etc. At present Metals Reserve is paying more than 52¢ for tin abroad.

IN THE FORMING of tough beryllium copper parts, steel dies and punches wore rapidly . . . required frequent downtime for reconditioning. To remedy this, Carboloy Cemented Carbide replaced tool steel at two critical points especially subject to rapid abrasive action: the draw ring and extruding punch.

The result: Die and punch life stepped up 75 times . . . elimination of two costly copper plating operations formerly needed to insure adequate lubrication . . . quality of finish vastly improved.

Whether you work with beryllium copper, or any other metal, Carboloy Sheet Metal Dies will increase production, improve quality, decrease costs, keep presses in more continuous operation, and reduce —often eliminate—subsequent buffing or polishing.

Carboloy Die Specialists can show you how to get these outstanding benefits on your sheet metal operations also.

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SHEET METAL DRAWING DIES

CARBOLOY COMPANY, INC.
Sole Makers of Carboloy Cemented Carbides
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West Coast . . .

OSGOOD MURDOCK

• CF&I and Wickwire merge West Coast interests . . . Kaiser starts mass output of housing units . . . Reports on ferruginous bauxite are reserve in Northwest.

SAN FRANCISCO — Colorado Fuel & Iron Co., Wickwire Spencer Steel Co., and the California Wire Cloth Co., have been undergoing a family tussle over nomenclature on the Pacific Coast subsequent to the CF&I absorbtion of Wickwire, with the littlest but oldest member of the family emerging victorious. CF&I and Wickwire Spencer recently settled on a compound hyphenation of their joint names after the consolidation of their two firms a few months ago, but last week arrived at the conclusion that the name of the California Wire Cloth Co., held more prestige and trade acceptance than did either of the other two. Having bought the 90-yr old California firm in 1938, CF&I has finally decided—not only for the sake of prestige, but also in the interests of efficiency—to consolidate the offices of all three firms into one coordinated operation on the Coast under the name of the California Wire Cloth Co.

This latter organization was founded in the Gold Rush days under the name of the Pacific Steel & Wire Co. Around 1911 Gen. Oscar F. Long, a brother-in-law of the late Mark Requa, of mining fame, bought Pacific Steel & Wire's subsidiary, the California Wire Cloth Co. Sixteen years later California Wire Cloth bought the ex-parent, Pacific Steel & Wire, both of which were subsequently purchased by the John D. Rockefeller interests around 1938 through the medium of the Rockefeller-controlled CF&I.

The output of all three firms—the eastern Wickwire Spencer, the Colorado company and the California Wire Cloth Co., have some overlapping of products, but probably a good deal more supplementing than duplication. CF&I, long identified with early western railroad building, has done a good but undeterminable volume of business on the coast in rolled products, balls, nails, staples, merchant trade and manufacturers' wire. Wickwire Spencer, of course, has enjoyed a substantial wire rope business in addition to insect screen, wire cloth, reinforcing fabric, and specialty wires. California Wire Cloth's stock in trade, as its name indicates, has been specialty wire, industrial cloth, poultry netting, fish traps and chain link fence.

Wickwire Spencer is estimated to have a coast volume of about $2,000,000; California Wire Cloth around $5,000,000 and CF&I's volume is somewhat of a trade secret, but nonetheless substantial. The coordinated operations of the three firms will involve some changes in executive personnel in their five offices. L. F. Quigg, executive vice-president of Colorado Fuel & Iron continues as president of California Wire Cloth; S. C. Pohlman is vice-president and general manager; J. A. Old, of Wickwire Spencer's San Francisco office becomes sales manager.

Three new assistant sales managers are H. R. Merriam and R. W. Browne of California Wire Cloth and Fred Hanson of CF&I's San Francisco office. L. H. Bennet in CF&I's Spokane office is transferring probably back to Pueblo, and Tracy Wahrlick is succeeding him. Harold Hanson, back from the service, will return to the company in charge of the Los Angeles office, while George Skarich will take over in Seattle.

The combined setup will operate three Coast warehouses: One in Oakland at the head office, one in San Francisco, and one in Los Angeles.

In the past year California Wire Cloth has been quietly adding new equipment to, and expanding by some 400 pct, the capacity of its South San Francisco plant. This addition, for all practical purposes, duplicates the facilities of the Oakland plant, turning out as it does, heavier woven wire, netting and mining screens, as well as brass, bronze, monel and stainless wires.

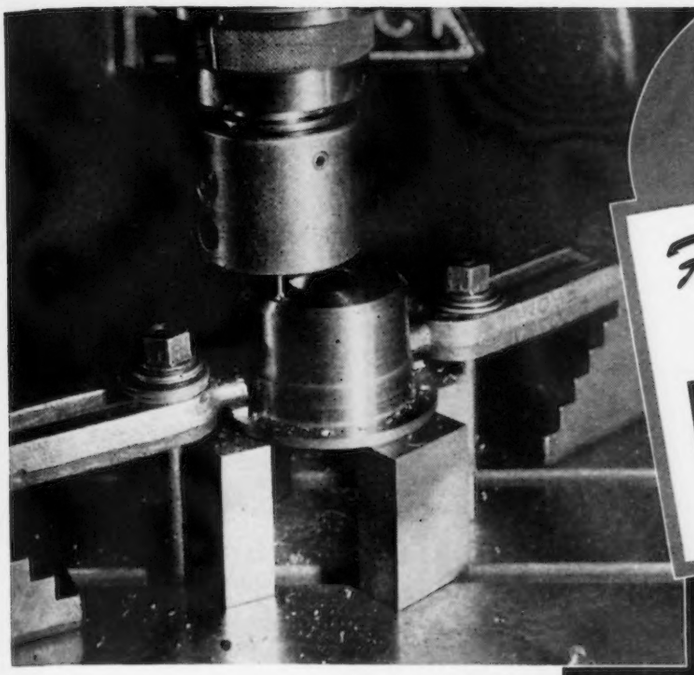
As the date for formal bids for Geneva draws closer, steel men are inclined to attribute undue significance to any moves on the part of potential bidders, but realize that this reorganization tightens up the distribution system of the three companies involved and puts them in a flexible position for any eventuality.

DESPITE the complications attendant to construction these days, Kaiser Community Homes Inc., is starting to build the first of its mass production units in San Jose this month.

The first batch of the announced 10,000 homes (THE IRON AGE, May 17, 1945, p. 84) will number 260 and occupy 50 acres. Originally slated to sell between $4000 and $5000, price of these units is presently estimated at $8000 which Henry Kaiser and Fritz Burns hope to lower to $6500 by mid-1946.

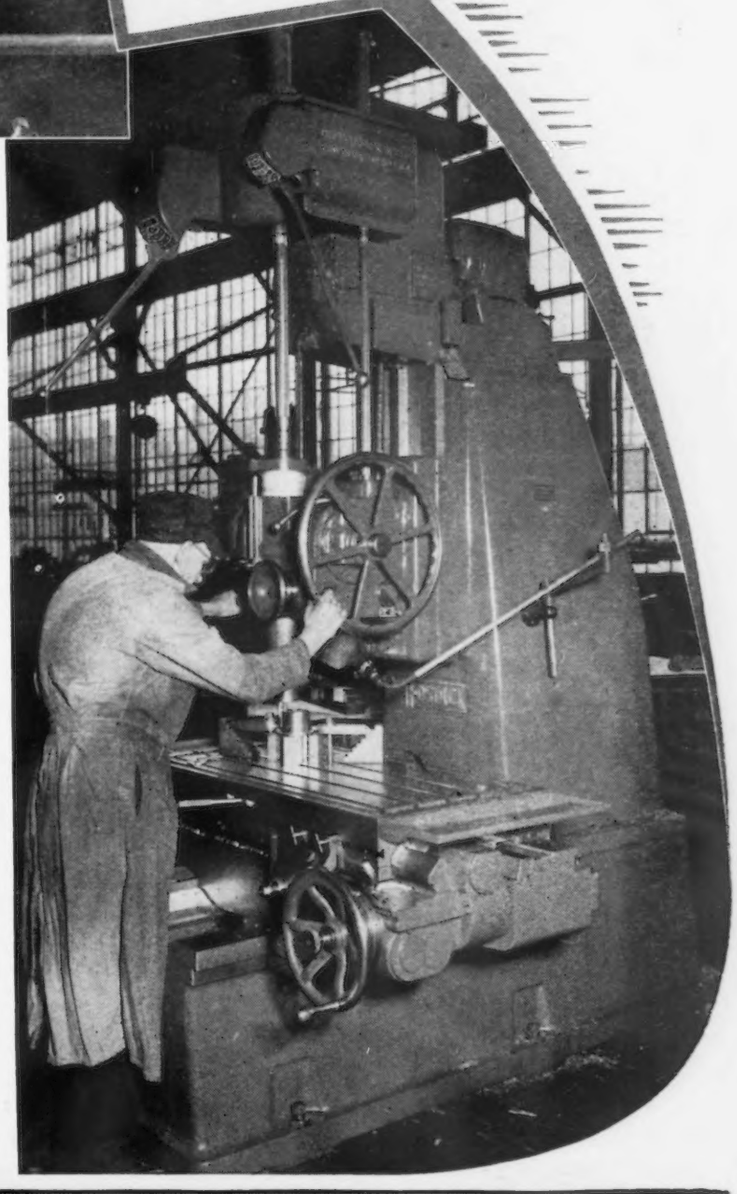
Intention of the Kaiser Community Homes company to launch their building project in the face of scores of all-but-completed houses standing idle for lack of bathtubs, refrigerators, plumbing fixtures, etc., included no reference as to where these accessories were to be obtained. Original announcement of the company made the "mechanical heart"—the bathroom and kitchen—probably the chief attraction and selling point of the project.

Best guess as to whether these necessities will be Kaiser-produced or bought on the open market is that time will tell, and that the development is going ahead



For Precision at lower Costs

FOSDICK JIG BORER



● Closer tolerances and lower cost are bound to be a factor in your post war operations.

Here's a practical precision machine requiring only a moderate initial investment that will meet your most rigid tolerance demands — and is adaptable to a wide range of precision drilling, boring, facing and similar operations.

You will also be agreeably surprised at the low cost of production—whether operating on short runs or on a high production job.

Where precision boring and costs are a factor consult Fosdick. Fosdick Jig Borer bulletin J. B. I. is available.

Write for one.

FOSDICK MACHINE TOOL COMPANY
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anyway in the hope that the necessities will be available when the time comes.

* * *

Clay P. Bedford, for 20 yr associated with the Henry J. Kaiser interests in heavy construction and recently responsible for the construction and operation of four Kaiser shipyards at Richmond, Calif., has been named vice-president in charge of manufacturing automobiles at the Willow Run, Michigan plant of the Kaiser-Frazer Corp. He succeeds Vern R. Drum who resigned.

This will be Mr. Bedford's first venture into the manufacture of consumer goods on a production line basis—the high speed production of 747 ships by prefabrication and assembly methods being his closest previous approach to Detroit methods of automobile manufacture. The Kaiser group gives much of the credit for the speed of ship construction to Mr. Bedford who developed many prefabrication short cuts. He is reported to consider the development and use of isometric drawings and photographs for worker training as one of his major contributions to speed and economy of ship building.

A graduate in civil engineering from Rensselaer Polytechnic Institute, Mr. Bedford joined the old Kaiser Paving Co. in 1925 and followed the fortunes of Henry J. Kaiser through a highway job in Cuba, gravel plants in California and dams at Boulder, Bonnevile and Grand Coulee. There is some conjecture that Mr. Bedford is now back at Willow Run to learn all that he can about automobile assembly against the day he may be called upon to manage a West Coast plant Mr. Kaiser has promised and which, incidentally, may be one of the Douglas Aircraft plants in the Los Angeles area if the latest rumors of negotiations prove true.

PORTLAND—"The most important known reserve of low-silica aluminous ore in the United States are the deposits of ferruginous bauxite aluminous ore in northwest Oregon," according to F. W. Libbey, W. D. Lowry, and R. S. Mason of the Oregon Dept. of Geology and Mineral Industries.

A bulletin released by the department reports in considerable detail the geological, metallurgical and economic aspects of the reserves which the investigators believe sufficiently large to warrant the establishment of an alumina industry in the Northwest.

Even though the alumina content of these deposits is low compared to bauxite suitable for the Bayer process these deposits are understood to be of commercial value. This contention is based on their proximity to the aluminum reduction plants in the Northwest and the value of the iron which would be recovered in processing. At present the nearest source of alumina to these Oregon and Washington plants is the small producer at Salt Lake City, Utah. While further exploration is necessary to determine the total volume of ore present, two localities in Washington County alone are said to have deposits of more than 5 million long tons of ferruginous bauxite.

Alumina content of the ores varies throughout five counties. Average analysis on the deposits runs: 34.68 pct alumina; 23.12 pct iron; 9.48 pct silica; 4.85 pct titania; and .176 pct phosphorus.

Using $45 as the selling price of alumina in the Northwest, the Oregon report gives the following analysis of the economics of production:

Bayer Process Ore—100 Tons	
55 pct Al_2O_3, 90 pct recovery, 49.5 tons alumina at $45	$2227.50
Less $8.00 per ton freight	396.00
Received by producer of alumina f.o.b. lower Columbia River points	$1831.50
Oregon Ore—100 Tons	
35 pct Al_2O_3, 90 pct recovery, 31.5 tons alumina at $45	$1417.50
23 pct Fe, 90 pct recovery, 22.5 tons iron at $17.90*	370.53
Value of combined alumina and iron	$1788.03

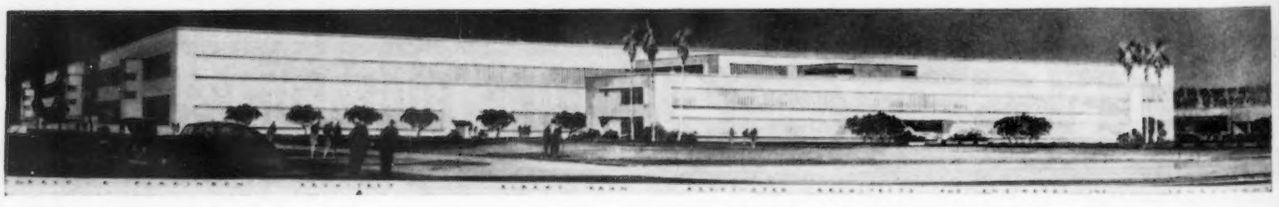
* Average value per net ton of pig iron at blast furnaces in the United States in prewar year 1940 according to U. S. Bureau of Mines Minerals Yearbook.

The department's report points out that the above comparison is predicated upon economic treatment of the Oregon ores and that a lower percentage of recovery could be expected in treating Oregon ore. It is further stated that this disadvantage would probably be offset by cheaper mining costs.

It is suggested that while the Bayer process is not suitable for the treatment of these ores, the Pedersen process, which has been applied on a commercial scale in Norway to analogous material, might be adapted to these Oregon ores.

With the reduction of the limited reserves of high grade bauxite in the United States during the war, the Oregon deposits take on considerable significance if this country is to be independent of foreign sources according to the report. If these deposits prove commercially profitable, the lower Columbia River points could develop the integrated industry which it has long desired.

WEST COAST EXPANSION: *Three new buildings are being erected by General Motors at Los Angeles to add* 400 *cars and trucks daily to Chevrolet production. An interesting architectural innovation, developed by Donald B. Parkinson, Los Angeles architect, with Albert Kahn Associated Architects and Engineers as consultants, consists of "sunshade" type windows. These deep set windows are fronted by fixed panels resembling a venetian blind stood vertically. Each concrete panel, 2 ft long and 7 ft high, is so angled that sun rays cannot reach window glass and transmit heat to the interior, although light is admitted.*



Aluminum on Steel!

The bonding of aluminum to sheet steel was an important milestone in Armco Research. It merged the strength of sheet steel with the heat resistance, corrosion resistance and reflectivity of an aluminum coating. ARMCO ALUMINIZED Steel is giving these important advantages to many manufacturers—helping them make more attractive, longer-lasting products. Your designers are invited to try ARMCO ALUMINIZED in *your* products. Write us. The American Rolling Mill Co., 201 Curtis St., Middletown, Ohio.

SPECIAL-PURPOSE SHEET STEELS

ALUMINIZED ARMCO STEEL

THE AMERICAN ROLLING MILL COMPANY

European Letter . . . JACK R. HIGHT

• Nationalization of British mines to be paid for in government stock issue . . . Evaluation to take two years.

LONDON—Compensation equal to that obtained by "a willing seller to a willing buyer" is to be the basis of nationalization of Britain's coal mines, according to legislation introduced in Parliament by the Labor Government. Mines engaged in producing coal principally or entirely for iron and steel production are specifically exempt from the program, and are to remain in private hands.

Payment for the mines will follow the pattern defined in the legislation for the assumption of the assets of the Bank of England, and will be largely an operation of exchanging paper for paper. Government stock issues are to replace shares and debentures presently held, to prevent a flood of money reaching the money markets, and limitations are to be provided on the disposal of the government stock issues.

The Coal Industry Nationalization Bill, as introduced, will provide: A tribunal which is to establish the value of the industry's assets; a National Coal Board of nine persons to acquire the mines and to manage the industry after the acquisition; supervision of the activities of the Board by the Minister of Fuel and Power (Emanuel Shinwell); and the establishment of domestic and industrial consumers' councils to advise the Minister.

The measure is the first specific legislation for the nationalization of a "basic" industry in Britain, and when it becomes law will provide for the acquisition and operation of a number of allied facilities, including coke ovens, manufactured fuel plants and electricity plants.

Key instrument in the plan is the National Coal Board, which will have three basic functions to supervise:

(1) Mining of coal.
(2) Securing the "efficient" development of the mining industry.
(3) Making the supplies of coal available to the public at such prices and in such quantities as the board deems in the public interest.

The Board will consist of a chairman and eight other members, all of whom are to be appointed by the Minister of Fuel and Power. According to the intention of the bill the members of the Board are to be selected on the basis of "highest ability and proved efficiency in all aspects of commercial and industrial administration, including the organization of labor."

"It is the government's intention that the Board shall work as a business corporation, free of the civil service, and have a free hand in the matter of everyday administration. Too much centralization in the actual operation of production is to be avoided."

The Minister's orbit in the operation is to include general direction of the industry through the Board, especially in matters involving employment policies and large capital investments. These latter provisions are designed to bring the industry within the scope of the overall industrial planning being carried out by the government.

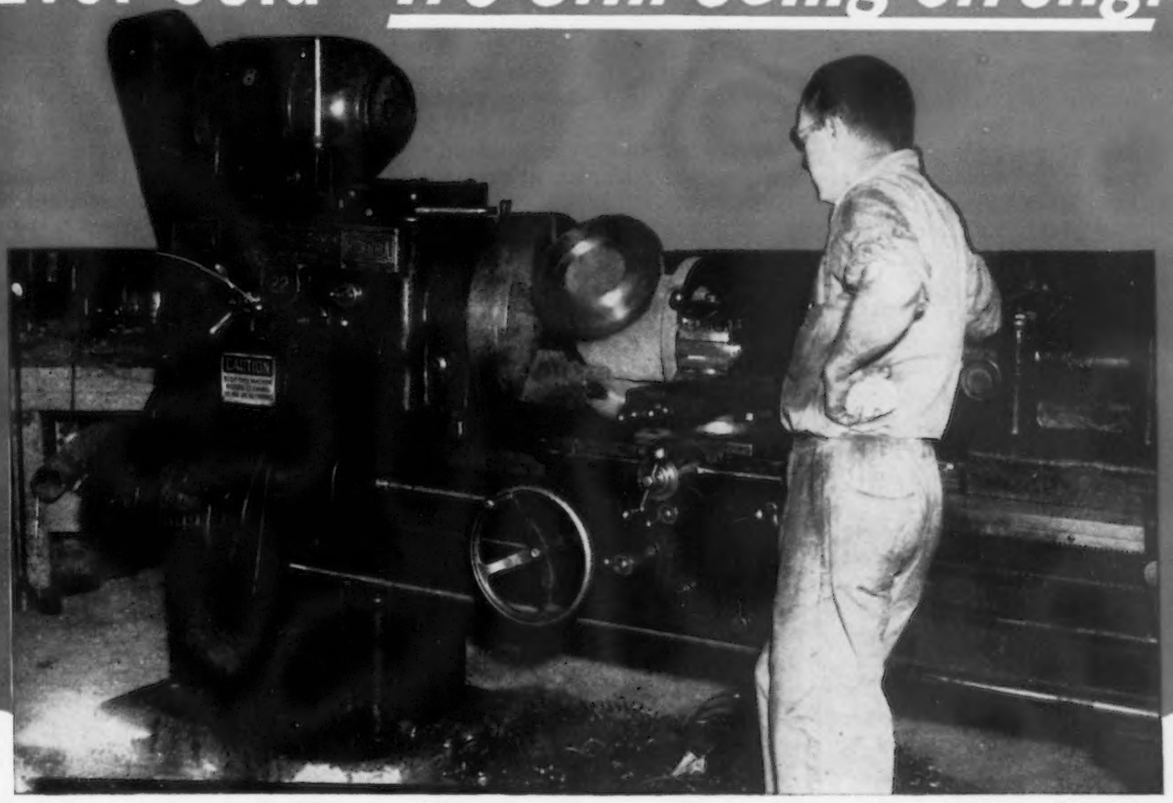
The most difficult problem in the program will be the actual transfer of assets, a program which it is estimated will require at least two years of work before completion. For the basic mining operations themselves there will be three distinct operations in the evaluation process.

A tribunal consisting of two supreme court judges and an accountant will determine the aggregate valuation of all the facilities by arbitration; this sum will be divided between various districts by a Central Valuation Board, and the actual allocation to individual firms by district boards. The last named boards will have evaluated the industries in each district and these figures will then be scaled up or down by the Minister proportionately to fit into the initial valuation of the whole industry.

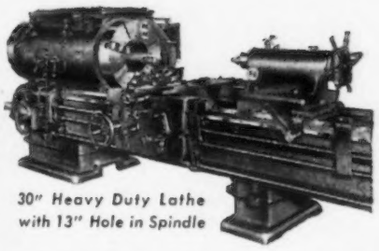
Industries allied to the mines,

CAUSE AND REFLECT

Here's the FIRST Hydratrol Lathe Ever Sold — *It's Still Going Strong!*



10 Years of Grueling Service for Lathe #5155



30" Heavy Duty Lathe with 13" Hole in Spindle

5 SIZES—18" to 36"

Small	18" up to	7½" Hole
Medium	24" up to	12" Hole
Large	27" up to	13" Hole
Large	30" up to	14" Hole
Large	36" up to	16½" Hole

(Standard type lathes, 16" to 36")

THIS HYDRATROL LATHE was used by the original purchaser 9 years, most of that time 24 hours a day, 7 days a week. During this period the purchaser bought and used $700,000.00 of HYDRATROL LATHES!

Having a surplus of this particular size, the owner sold Lathe #5155 in 1944, to the Corpus Christi Machine Shop, Corpus Christi, Texas, in whose shop the above photo was taken.

The new owner recently wrote us: "Hydratrol Lathe #5155 has given excellent service, and has never given any trouble. It is rugged enough to handle heavy work and still maintain the extreme accuracy originally built into the machine."

LEHMANN MACHINE CO., St. Louis 3, Mo.

HYDRATROL LATHES*

*LARGE HOLLOW SPINDLE TYPE

but not actually coal-working operations will be acquired on a slightly different basis, with the district boards establishing values which are to be paid without further adjustment and without reference to an aggregate figure for the whole country.

The assets to be transferred to the government are included in four general classes:

(1) Assets to be transferred without option, essential to coal mining and those auxiliary operations such as coke ovens, manufactured fuel plants and power stations owned by mining concerns.

(2) Assets to be transferred at the option of the board or owners. These include assets closely connected with the mines, such as brick works, wharves, houses and farms.

(3) Assets to be transferred at the option of the owners or Board but subject to arbitration in case of objection. Under this head are those operations which are not actually owned by mining firms but rather by persons primarily interested in mining firms.

(4) All other assets owned by mining firms, *excluding facilities used wholly or mainly for supplying iron and steel works in the same ownership as the mines.*

To furnish the funds for the acquisition the Board is to be advanced sums by the Minister of Fuel and Power up to £150,000,000 ($600,000,000) within the first five years of the act, and later as Parliament may determine. The Board is to be given the power to borrow temporarily up to £10,000,000 ($40,000,000).

In an effort to make industry financially independent of the government the Board will be liable to make payments to the Minister to recoup the expenses accruing from the acquisition of the properties, and in providing capital. If the Board is unable to make such payments the Minister must so report to Parliament. The Coal Board will be subject to regular payments of taxes and of rents, as well as interest and sinking fund money on funds furnished by the Treasury. A reserve fund is to be established by the Board and the Minister is to have power of direction over the disposal of any accumulation of excess revenues.

The arbitration board which will hold the key to the amounts to be paid for properties will consist of two judges of the supreme court to be named by the Lord Chancellor and an accountant to be mutually agreed upon by the government and the owners. If no agreement can be reached on this appointment the president of the Institute of Chartered Accountants for England and Wales will make an arbitrary appointment.

The figure to be arrived at by this tribunal is to be the theoretical value which would be obtained in the open market if the properties were offered as a single unit by a willing seller to a willing buyer on the basis of the net annual revenue which the assets as a whole might be expected to earn in the future (if they were not transferred to government ownership) and the number of years' purchase to be applied thereto.

The tribunal is directed in the bill not to make any allowance in the valuation for the fact that the acquisition is compulsory, nor for the expense of distributing the costs among the many owners. No allowance is to be made for a presumed increase in value after the transfer because the properties will be under a single ownership.

The bill calls for the government and the owners to exchange their cases, and for the cases to be filed with the tribunal not later than March 30, 1946, and for replies to be exchanged not later than 14 days thereafter. The bill, including 58 clauses and three schedules, will probably come up for its second reading in Commons late this month.

British Steel Prices Advanced About 5 Pct

London

• • • **British steel prices** were increased generally about 5 pct by the Ministry of Supply on Dec. 31, 1945. The adjustment was to cover increased fuel and imported ore costs.

Basic pig iron was advanced $4.02 a ton while autobody sheets were reduced $8.04 (£2) per ton (see THE IRON AGE, Nov. 29, 1945, p. 98).

Steel billets were marked up $1.50 per ton while plates were advanced $3.30 per ton.

Stainless sheets and strip and tinned sheets are up 10 pct while heavy bar sections, sheet piling, bridge sections and heavy rails were advanced $3.30 a ton. Light rails were marked up $4.23 a ton.

Some special tubes and fittings were reduced 3 pct but boiler tube prices were advanced up to 12 pct. Steel forgings were completely repriced with increases averaging 12 pct.

Cast iron, including soil pipe and gutters, increased 12½ pct. These are notable exceptions. Other items were adjusted at or near a 5 pct higher level.

The steel industry here says the reduction of autobody sheets is the first opportunity to realize economies of continuous mills.

Iron ore and cinder were removed from price control. The central fund for maintaining prices at the 1940 level was discontinued but some assistance on ore freight costs are still offered by the government.

Bolt Assn. Honors Member

Perryston, Glasgow, Scotland

• • • **In recognition of his** contributions to the manufacture of heat treated steel bolts and other accomplishments in the screw machine industry, A. P. Newell, head of A. T. Newell Co. Ltd., Possilpark, Glasgow, was recently honored in a presentation ceremony.

A. P. Newell

Maj. C. R. Dibben, independent chairman of all bolt and nut associations of Great Britain, accompanied by G. F. W. Richards, deputy chairman of the Black Bolt & Nut Assn., came to Perryston and presented Mr. Newell with an illuminated address and a large silver tea tray.

The company, a manufacturer of screw machine parts and heat treated bolts, is very well known throughout the islands; and Mr. Newell is well acquainted in the United States.

A SERVICE AS RELIABLE AS THE PRODUCTS

WAREHOUSE
STEEL PRODUCTS

BATES GRATES
OPEN STEEL FLOORING

APS PLASTEEL
ROOFING and SIDING

and now—

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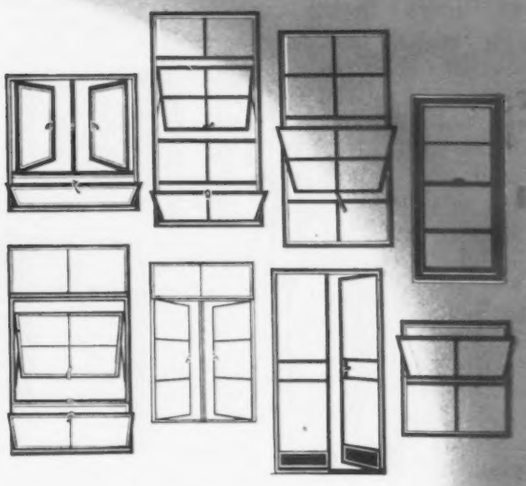
· STEEL · WINDOWS



DURING the war years just past, despite scarcity of materials, manpower shortages and restrictions, Levinson maintained its reputation for reliable warehouse service.

During these years, particularly in the tri-state area, they met the ever-increasing demands for such high-quality products as Plasteel Roofing and Bates Grates.

Levinson has been almost fanatically discriminating in their selection of the products they distribute. No less selective was the choice of THORN Steel Windows, now also being distributed by Levinson Steel Sales Co.

These products, proven by time and performance, are backed by a service as reliable as the products!

LEVINSON STEEL

LEVINSON STEEL SALES CO.
Pittsburgh 19, Pa.

PERSONALS

° ° °

• **John R. Johnston,** assistant manager of the Chicago district sales office, Carnegie-Illinois Steel Corp., since 1938, has been appointed manager of the Milwaukee district sales office. He is succeeded at Chicago by **John H. Morava,** who was assistant to manager of sales at Chicago before entering the service in World War II. **Howard J. Mullin** has been named assistant manager of the St. Louis district sales office. **John A. English, Jr.** leaves the position of assistant manager of railroad material sales in the Chicago district to become assistant manager of Detroit district sales. **Edward W. Backes** succeeds Mr. English in the Chicago post.

• **J. H. Walsh,** vice-president in charge of steel works, Inland Steel Co., has retired from active service, but will remain a director of the company. He has been associated with Inland since 1922, serving as assistant general superintendent, general superintendent, and works manager. In 1941 he was elected vice-president in charge of the Indiana Harbor plant. **Fred M. Gillies,** general superintendent at Indiana Harbor since 1939, becomes works manager. He joined the company in 1922 as superintendent of the 100-in. plate mill, and was assistant general superintendent from 1930 to 1939. **A. P. Miller,** assistant to the general superintendent at Indiana Harbor since 1937, succeeds Mr. Gillies as general superintendent. **A. J. Cochrane** has been named assistant general superintendent, and **W. A. Perry,** assistant to the general superintendent.

• **Herbert J. Rosen** has been elected executive vice-president of Griffin Wheel Co., Chicago. He has been associated with the firm for 45 yr.

• **Ralph Powers** has been named engineer in charge of electronic engineering at Allis-Chalmers Mfg. Co., Milwaukee, succeeding **J. M. Cage,** resigned. Mr. Powers was formerly associated with Bundy Tubing Co., the Electronic Control Corp., Chrysler Corp., and Bell & Howell Co.

• **Com. R. H. Stokes-Rees,** recently retired from the Royal Navy and now with the export dept. of English Steel Corp.-Vickers, Ltd., arrived in this country a short time ago. During his stay he will make his headquarters in the various offices of A. Milne & Co.

• **Richard W. Banfield** has been elected treasurer of Pratt & Whitney, division of Niles-Bement-Pond Co., W. Hartford. Mr. Banfield succeeds **Everett L. Morgan** who has retired from the position of company treasurer after 48 yr of continuous service with Niles-Bement-Pond. Mr. Banfield first came to Pratt & Whitney in 1935. He is already secretary and office manager, and now adds the duties of treasurer. **Ernest J. Meuten,** at present assistant secretary of the company, has been appointed assistant treasurer under Mr. Banfield.

• **Thomas C. Phillips** has been appointed an assistant general manager of sales of Pittsburgh Steel Co., Pittsburgh. His duties will be concerned chiefly with sales of the company's Monessen works steel and wire products. Mr. Phillips, except for a few years with Johns-Manville handling certain Pittsburgh Steel Co. products, has been associated with Pittsburgh Steel Co. in production and sales capacities for the past 30 yr, and since 1941 was dealer sales manager of construction products.

• **Foster M. Gruber** has been appointed administrative assistant to Ray Ellinwood, president of Ellinwood Industries, Los Angeles. Mr. Gruber began his career as a draftsman for Boeing Aircraft, later joining Wright Aeronautical Corp. of Paterson, N. J., where he remained for 3 yr. He was a test engineer.

• **George C. Brainard** has been elected president and general manager of the Addressograph-Multigraph Corp., Cleveland, to succeed **Joseph E. Rogers,** who continues as chairman of the executive committee and a member of the board of directors. Mr. Brainard has resigned as president of the General Fireproofing Co. of Youngstown, a position which he held from 1928 to date. He will continue as a member of the company's board of directors.

FRED T. H. YOUNGMAN, president, Jessop Steel Co.

• **Fred T. H. Youngman,** formerly executive vice-president of the Jessop Steel Co., Washington, Pa., has been elected to the office of president. **R. Edson Emery,** former president, has been elected to the office of chairman of the board. **W. C. Buchanan,** president and director of Globe Steel Tubes Co. of Milwaukee, was elected a director. **Andrew J. Dallstream,** senior partner of Pam, Hurd & Reichmann, Chicago, and **Linwood A. Miller,** Chicago, were also elected directors.

• **John L. Moser** has been appointed abrasive engineer for northwestern Pennsylvania and southwestern New York with headquarters in Erie by Norton Co., Worcester, Mass. He succeeds **R. W. Crawford** who has become president of the Erie Mfg. & Supply Co.

• **Norborne Berkeley** has been elected vice-president of Bethlehem Steel Co., and **William H. Collins** has been elected vice-president in charge of the Shipbuilding Div. succeeding A. B. Homer, newly elected president. Mr. Berkeley, who has been assistant to the president since 1930, will continue to serve as executive assistant to the chairman.

• **C. L. Snowdon, Jr.** has been elected president of Reliance Steel Casting Co., Pittsburgh. **Elmer A. Blasdell** has been elected vice-president; **J. G. Thompson,** treasurer; and **O. L. Kingsborough,** secretary.

Carbon Bar Div. of Bethlehem Steel Co., Bethlehem, Pa., and **C. M. Ballard,** manager of sales of the Wire Rope Div., have retired. **George B. Troxell,** manager of ordnance sales, will succeed Mr. Steuer, and Mr. Ballard will be succeeded by **N. R. Downie. Charles P. King,** manager of sales, and **J. F. Glenn,** contracting manager at the Atlanta office, have retired. **J. E. McQueen,** formerly resident representative at Savannah, Ga., will succeed Mr. King as manager of sales. **W. A. Aichel** will succeed Mr. Glenn as contracting manager. And **D. S. Blankenship, Jr.** will succeed Mr. McQueen as resident representative. **Jesse A. Davis,** manager of sales at the Baltimore office, has also retired and will be succeeded by **S. C. Husted,** assistant manager of sales. **B. L. Hagberg** will succeed Mr. Husted. **A. M. Conneen, Jr.,** contracting manager, and **G. E. J. Pistor,** contracting engineer of the New York office, have retired. **C. E. Simmons,** assistant contracting manager, will succeed Mr. Conneen. **E. D. Bickford** has been appointed resident representative at New Haven, Conn. **J. W. Davis,** contracting manager at the St. Louis office, has retired, with **W. R. Stevens** succeeding him.

• **V. W. Bergenthal** has retired as an executive officer of the Wagner Electric Corp., St. Louis. Mr. Bergenthal, who will continue to serve as a director, has been with Wagner for 41 yr. He is succeeded as treasurer by **J. D. Eby** who has been elected secretary-treasurer of Wagner Electric Corp. Mr. Eby already held the position of secretary, having been elected to that position in September 1945.

• **E. J. Hunt,** formerly operating manager of the Chrysler Tank Arsenal, has been appointed manager of operations at the Willow Run, Mich., plant of Kaiser-Frazer Corp. **Albert W. Lavers,** formerly administrative engineer of Harry Ferguson, Inc., has been named chief engineer of the Graham-Paige Farm Equipment Div., also with headquarters at Willow Run.

• **Robert T. Harris,** formerly vice-president in charge of the construction equipment dept., Blaw-Knox Div. of the Blaw-Knox Co., has been elected president of the Matt A. Doetsch Machinery Co., Washington. The Matt A. Doetsch Machinery Co. has represented the Blaw-Knox Co. in the sale of construction machinery for some years, and will continue this representation.

• **W. E. Fish** has been named assistant general sales manager for Chevrolet Motor Div., General Motors Corp., Detroit, in charge of the eastern half of the United States, and **G. I. Smith** assumes the same job for the western half. Both have been with Chevrolet many years.

• **M. J. Anderson** has become affiliated with the Aro Equipment Corp., Bryan, Ohio, as sales and service engineer. He was recently released from the AAF. **D. J. Nelson** has joined the sales organization of F. W. Busch, Aro's New York state representative, and will sell Aro pneumatic tools in that territory.

• **James A. Downey, Jr.** has returned to Sloss-Sheffield Steel & Iron Co., Birmingham, as director of personnel and manager of the company's safety dept. after serving as area manager for the War Manpower Commission.

• **George D. Shaeffer,** former chief engineer of Gar Wood Industries, Inc., Detroit, has been elected vice-president in charge of engineering of the company.

• **John M. Stewart,** resident manager of Hickman, Williams & Co.'s Pittsburgh office, has been elected to the company's board of directors. Mr. Stewart has been with Hickman, Williams & Co. continually since beginning his duties at their Pittsburgh office June 1909.

• **E. J. Bush** has been elected president and treasurer of the Diamond T Motor Car Co., Chicago, succeeding **C. A. Tilt,** who has retired from the presidency to become chairman of the board. Mr. Tilt served 40 yr as president and general manager of the company.

CHARLES W. DOERR, vice-president in charge of erection, American Bridge Co.

• **Charles W. Doerr** has been elected vice-president in charge of erection, American Bridge Co., Pittsburgh, U. S. Steel subsidiary. He succeeds **Curtis S. Garner,** who is retiring after 50 yr service with the company. Mr. Doerr began working for American Bridge as a draftsman in 1912 and has been manager of erection since 1937. In his new duties, he will direct all of the company's erecting activities throughout the world.

• **L. L. Colbert,** recently general manager of the Dodge Chicago plant of Chrysler Corp., has been made president of the company's Dodge Div. He replaces **H. L. Weckler,** who will devote his time exclusively to his work as vice-president and general manager of the corporation.

• **J. D. Clokey, Jr.** has been appointed general manager of sales of Washington Steel Corp., Washington, Pa. Mr. Clokey formerly was associated with Superior Steel Corp. and during the war was chief of Special Projects Div. of Steel Recovery Corp., a governmental war agency.

• **Frank C. Kardevan** has been appointed assistant manager of sales of Lukenweld, Inc., a division of Lukens Steel Co., Coatesville, Pa. Mr. Kardevan has served with the Lukenweld sales dept. for 4 yr and with the Combined Sales Div. of Lukens since 1944.

• **A. S. Robertson,** who has just returned from military service, has been appointed purchasing agent of Montour Railroad Co., with offices at Coraopolis, Pa. He will also have charge of the stores dept.

• **E. R. Nary** has been appointed assistant to Westinghouse Electric Corp.'s vice-president, Walter Evans, with broad responsibilities for operations of the Industrial Electronics and X ray Divs. at Baltimore and the Home Radio Div. at Sunbury, Pa.

• **Samuel A. Ott** has been added to the staff of Pittsburgh Alloy Corp., Pittsburgh. Mr. Ott recently was openhearth superintendent for Follansbee Steel Corp., Toronto, Ohio. He will center his activities on raw materials and metals for the steel industry.

• **A. M. Stephenson** and **A. B. Jordan** have been appointed district representatives in the southern territory for Iron Fireman Mfg. Co., Cleveland. Mr. Jordan succeeds **S. W. Alford,** who has been promoted to district sales manager in the southern division district.

• **L. A. Kristoff** has been appointed head of permanent mold technique and production for the John Harsch Bronze Foundry Co., Cleveland. He was previously associated with the National Smelting Co., the National Bronze & Aluminum Co., and later was chief metallurgist of the National Aluminum Cylinder Head Co. He was also plant metallurgist for Reynolds Metals.

• **Col. M. E. Erdofy** has joined the executive staff of Lithaloys Corp., New York. Widely known as a consulting metallurgical and industrial engineer before the war, Col. Erdofy for the past 4 yr has served with the Corps of Engineers, U. S. Army.

• **Clyde W. Blakeslee,** general manager of N. A. Strand & Co., Chicago, has retired from the management of the company, but will still be associated with them in an advisory capacity. He served as general sales manager and general manager for the past 25 yr. **Wilburn H. Swanson,** superintendent and general purchasing agent, has been appointed general manager.

• **G. R. Clover,** representative of General Electric's Michigan sales district for 25 yr, has been appointed sales manager of the newly-acquired Rectified Fluorescent & Cooper Hewitt Fixture Div. of the Electro Mfg. Co., Chicago.

• **L. A. Davies,** who owns and operates the Davies Supply & Mfg. Co. of St. Louis, has been appointed by the Udylite Corp. of Detroit as distributor for Missouri, Arkansas, Oklahoma, Kansas, Texas, and Louisiana.

• **Logan Miller,** superintendent of the Willow Run bomber plant during the war, has been promoted to general superintendent of the Rouge plant of Ford Motor Co.

• **O. R. Lutz** has been appointed service engineer on Janitrol gas-fired heating equipment of Surface Combustion Corp. at the company's Columbus, Ohio, plant.

• **J. MacDonald Smith,** for many years associated with the Hanson-Van Winkle-Munning Co. and its predecessor, A. P. Munning & Co., has retired and will associate himself with Sundmark Supply Co. of Los Angeles, distributor of Hanson-Van Winkle-Munning products.

• **Richard P. Dodds,** advertising and sales promotion manager of Truscon Steel Co., Cleveland, for more than 8 yr and more recently manager of Truscon's dealer-commodity dept., has resigned to join Lang, Fisher & Stashower, Inc., Cleveland advertising agency, as vice-president. Mr. Dodds joined the Truscon organization in 1934.

• **Irving F. Wagner,** manager of American Brake Shoe's Kellogg plant at Rochester, N. Y., has been made a vice-president of the Kellog Div. Mr. Wagner has been associated with Brake Shoe since 1923, and during the war was contracts officer.

• **Dr. John G. Dean** has joined the Development & Research Div. of the International Nickel Co., Inc., New York, as senior fellow-in-absentia of Mellon Institute of Industrial Research, Pittsburgh.

• **M. E. Bash** has been appointed manager of export sales of A. Milne & Co., with headquarters at New York.

• **Frank O. Leitzell** has been elected executive vice-president of the Arms-Franklin Corp. with offices in Youngstown, Ohio. Mr. Leitzell was with the Lewis Foundry & Machine Div. of Blaw-Knox Co. for 10 yr as vice-president in charge of engineering and sales.

• **Col. Jesse G. Vincent,** vice-president in charge of engineering at Packard Motor Car Co., Detroit, has been elected to the board of directors of the firm.

• **W. Lyle Richeson, Frederick H. Norton** and **Philip A. Hollar** have been elected vice-presidents of American Car & Foundry Co., New York.

• **Sidney G. Down,** first vice-president and director of Westinghouse Air Brake Co., Wilmerding, Pa., has retired, climaxing 44 yr of service with the company during which time he rose from a traveling air brake instructor to one of the top executive posts. He will retain his directorship of the company.

OBITUARY...

• **Herbert A. Stone,** 63, who retired last June as assistant purchasing agent of the American Screw Co., Providence, died Dec. 19.

• **W. D. Woolson,** treasurer of Jones & Lamson Machine Co., Springfield, Vt., died recently.

• **Eugene C. Argust,** vice-president and secretary, Morden Frog & Crossing Works, Chicago, died Dec. 19.

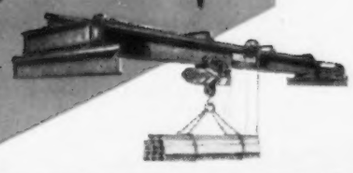
• **Alex Sarkozy,** owner of the S & F Tool Co., Detroit, died recently. He helped found the company in 1918.

• **Frank S. Warzeski,** 61, vice-president of the Linde Air Products Co., New York, died recently after a short illness. Mr. Warzeski began his association with units of Union Carbide & Carbon Corp. in 1912 as an engineer with the Linde Air Products Co. Subsequently he held many engineering and executive positions with subsidiary companies of Union Carbide.

Northern *Overhead Cranes*

use no floor space— cause no traffic congestion

can handle any load



In considering material handling methods and equipment, remember that an overhead crane doesn't need floor space —carries the load through the air where it can't cause traffic congestion—places it on the desired spot—accurately.

When floor space is at a premium, elimination of wide aisles may be important. A crane permits much better utilization of floor space. A Northern Crane, designed for maximum hook lift provides more usable headroom.

Northern Cranes are available to handle any type or weight of load.

Write for Bulletin on Northern Cranes—the fine machine tool of material handling.

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HOIST CRANES • HAND CRANES • ELECTRIC HOISTS
AIR HOISTS • SPECIAL CRANES AND HOISTS

Dear Editor:

MACHINE TOOL PUBLICATIONS

Sir:

We are interested in securing several of the machine tool industry publications. We understand that you publish the greatest portion of them and would like to know what is the most read.

FRANK SPIVAK
Dragul & Spivak Realtors,
Cincinnati 2

● The Iron Age publishes all significant technical and news developments pertinent to the machine-tool industry. For shop practice, "American Machinist" and "Machinery" are also excellent choices.—Ed.

HEAT TREATING TECHNIQUE

Sir:

We note with interest the article appearing in the Dec. 6 issue on the subject of "Heat Treating Beryllium Copper" by H. G. Williams. We should like to obtain two sets of tear sheets.

S. P. SNYDER,
Technical Advisory Service
Revere Copper & Brass Inc.,
Chicago 35

● Tear sheets have been mailed.—Ed.

CASTING MACHINE

Sir:

We are considering the marketing of a small casting machine in connection with which we will require iron castings in quantities. We wonder whether you could refer us to a foundry which would make up for us (for experimental purposes) one iron casting from either a wood or plaster pattern that we would furnish.

H. SACHS
Metal Cast Products Co.,
New York

● We are sending you the names and addresses of several nearby gray-iron foundries that may be able to help you.—Ed.

STATISTICAL ERROR

Sir:

I notice in THE IRON AGE of Jan. 3, p. 81 in the table showing steel consumption by groups for 1945 what appears to be a transposition error. I have checked the totals and find them correct but I believe that the figures shown for oil and gas, pressing, stamping and forming, and railroads have been mixed up.

GEORGE MERCHANT,
Assistant Treasurer
New York Airbrake Co.,
New York

● You are correct. A transposition occurred here which is regrettable and uncalled for. Correct figures for 1945 consumption covering the groups you mention are as follows: Oil and gas 2,670,079 tons or 4.8 pct of the total; pressing, stamping and forming 3,359,374 tons or 6.0 pct; and railroads 5,267,778 tons or 9.6 pct.—Ed.

POLYVINAL HAMMERS

Sir:

In your column News Front of the Dec. 27 issue, the fifth item reads "Polyvinal hammers are used in place of leather, rubber or wood hammers, etc." I don't exactly understand what is meant by this, but presume there is a possibility that you mean that "Polyvinal" is being used as a hammer board. If this is correct, I wish you would give me what additional information you can, or advise me where I may write for additional information.

H. G. IRWIN, JR.
Irwin Mfg. Co., Inc.,
Garland, Pa.

● The information we published on the use of Polyvinal hammers in Germany may be supplemented by Dr. Gordon M. Kline, Chief, Plastics Section, National Bureau of Standards, Washington, D. C.—Ed.

RUST PREVENTIVES

Sir:

Having read an abstract of J. Albin's article entitled "Specifying Rust Preventives" which appeared in the June 7 issue, we would appreciate having a full reprint of this for our files. Would you care to post a copy to us?

E. S. LOWER,
Technical Director
Croda, Ltd.,
Goole, Yorks, England

● Reprint has been forwarded.—Ed.

PIN BEARINGS ON CRANKSHAFTS

Sir:

We wish to learn about the special tool that may be in the market for truing up pin bearings on crankshafts at least 5½ in. in diam. If you have any idea as to who would have such a tool, we would appreciate the favor if you would kindly inform us.

J. ECKER
Ecker-Erhardt Co., Inc.,
Chicago

● We do not know. Suggest you telephone some railway equipment supply house in Chicago as we believe there is an application for this tool in railroad shops.—Ed.

THRUSTORQ

Sir:

I am writing to correct an impression which seems to be causing some embarrassment for Hagan Corp. in connection with a short release on its Thrustorq, which you printed in the Nov. 22 issue. It uses the name as Thrustor, which is incorrect, as it is the name of a device owned by GE. Furthermore, the address of the company is given as 2402 E. Carson St., Pittsburgh, which is the address of the George J. Hagan Co.

HARRY STANLEY,
Public Relations Dept.
Ketchum, MacLeod & Grove, Inc.,
Pittsburgh

● Sorry, we missed up on our p's and q's. —Ed.

75S ALCLAD

Sir:

Please send me the tear sheets on the two part article "Heat Treating, Forming & Welding 75S Alclad" which appears in the Dec. 6 and 13 issues.

K. G. PRESSER,
Chief Metallurgist
National Supply Co.,
Springfield, Ohio

● Tear sheets have been mailed.—Ed.

FLUOROSCOPY

Sir:

I would appreciate receiving a copy of the article by B. Cassen and D. S. Clark on fluoroscopy, which appeared in the Nov. 1 issue.

HERBERT R. ISENBURGER
St. John X-Ray Service, Inc.,
Long Island City, N. Y.

● Tear sheets of "Fluoroscopy of Light-Alloy Castings" have been mailed.—Ed.

WESTERN STEEL DISPOSAL

Sir:

Enclosed please find 20¢ in stamps for two reprints of the "Iron and Steel Plants Disposal Report" published in your issue of June 21.

GEORGE D. RAMSAY
Consulting Engineer
90 S. Oak Knoll Ave.,
Pasadena, Calif.

● Reprints have been forwarded.—Ed.

ANNUAL REPORT

Sir:

I am very much interested in the article found on p. 90 of the Dec. 13 issue describing a booklet to be published by the Northern California Chapter of the American Foundrymen's Assn. If you can put me in touch with the proper party from whom I may be able to obtain a copy, I shall appreciate it very much.

G. N. BRAUMAN
American Locomotive Co.,
Dunkirk, N. Y.

● This booklet can be obtained by writing to the American Foundrymen's Assn., 222 W. Adams St., Chicago.—Ed.

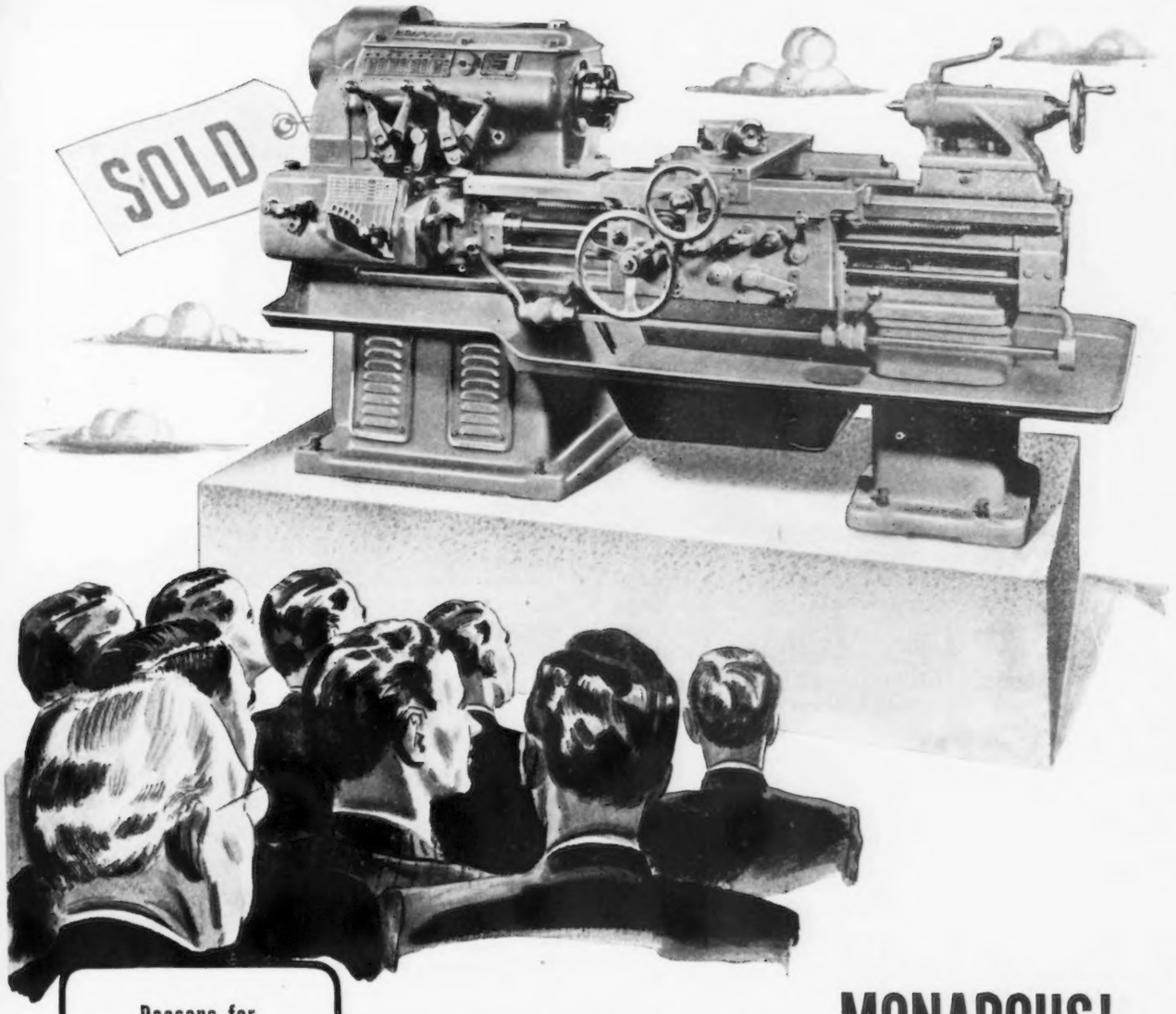
NEW BUILDING ESTIMATOR

Sir:

We have an 11th edition of the "New Building Estimator" by William Arthur. Would like to have a latest edition. Please send same c.o.d.

MR. WILBUR
Griswold-Ratliff,
Pendleton, Ore.

● "The New Building Estimator" is no longer printed. Consequently, we are unable to furnish a copy for you.—Ed.



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- Flame-hardened and ground bedways
- Hardened and ground parts throughout
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- Easy, convenient controls
- Automatic sizing
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"SOLD" signs appear quickly on Monarch Turning Machines, whenever they are listed at surplus machine tool sales. Alert buyers recognize Monarch's ability—proved in the grueling grind of wartime service—to retain their original accuracy, speed and high quality of production.

They know that flame-hardened and ground bedways and bearing surfaces, anti-friction bearings, force-feed lubrication and other important features enable Monarchs to turn more and better work at lower cost . . . for a long time.

So, when you hear of a surplus Monarch, you'd best move quickly. Ask our nearest office to check the machine with you, and to tell you about accessories and tooling that will help you gain the greatest benefit from your purchase. There is no cost or obligation for this service, so use it freely.

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38th and College Ave. Indianapolis, Ind

Representatives in Principal Cities

This Industrial Week . . .

- ***Steel Strike Seen as Almost a Certainty***
- ***Delivery Pressure Reaches a New High***
- ***Steel Ingot Rate Raised to 93 Pct***

WITH the shadow-boxing of Government, Labor and Industry reaching crescendo proportions this week over the steel wage controversy, there were no definite indications at mid-week that the main bout in the form of an industrywide steel strike would not take place next week.

Basically the steel union set the strike to enforce its demands for a $2 a day increase but subsequently indicated that a lower amount would be considered. The question of steel price increases this week, while nearing a conclusion, is not necessarily tied in with any possible postponement of the steel strike.

President Truman's remarks to the effect that there would be a "slight" increase in steel prices after steel company fourth quarter earnings are analyzed gave little solace to the steel industry. Such remarks left the steel price situation practically where it was more than a month ago.

A price adjustment has been demanded by the industry as a prerequisite for further wage negotiations, but such an increase would have no bearing upon how much of a wage increase could be granted because the industry plans to ask OPA for another price adjustment to cover any wage increase.

THERE is belief in the industry that the OPA steel price adjustment which is expected to be granted within the next week or so will fall far short of the industry's $7 a ton demand. It is expected, however, that even though a base price averaging around $2 to $2.50 a ton is granted, adjustments will be made on steel extras which would result in a greater net price return.

Pressure from customers anxious to secure delivery before a steel strike occurs in order to build up inventories reached unusual proportions this week. These attempts were useless, however, because the industry, already far behind on deliveries, was unable to give any better service than has been the case for the last few months.

With carryovers or delayed production at a new high, mills were hard pressed to maintain even current delivery schedules without tossing a wrench in the works by attempting to rearrange them. Tinplate shipments which were the first to experience heavy consumer pressure again were harassed by a temporary car shortage at some midwestern mills.

Most notable development among strike-bound consuming industries was notification to steel suppliers by General Motors that shipments to holding points scheduled for January should be halted. The action apparently did not affect equally all suppliers and all GM subsidiaries. One mill reports that Chevrolet had ordered shipments halted indefinitely but that no stop-order had been received from other manufacturing subsidiaries. General Motors now is believed to have steel stocks on hand adequate to provide at least 60 full days scale operation when manufacturing is resumed.

SOME mills have not been delivering full tonnages allowed under GM quotas in the belief that the steel should be diverted elsewhere so that it could be used immediately. The present GM stop-order on deliveries will help some other steel consumers but in the overall picture it will not go far towards easing shortages.

Steel orders this past week continued at the same high level noted since the general pickup in volume after V-J Day and apparently have reached the plateau reflecting a level of reconversion production. Based on this opinion it may be that the current order level represents the peak of anticipated production allowed by steel mill quotas. Behind such accepted business, however, remains an indefinite amount of steel tonnage representing what steel consumers would order if there was any chance of obtaining the material.

Barring a long disruption by the steel strike or shutdowns later this year because of a coal strike, current operating levels of steel mills appear adequate to take care of the amount of business being accepted with little addition to carryover tonnage. A prolonged interruption, however, would completely stymie the carrying out of present steel sales quotas.

Orders were to have been placed this week by the French Railway Mission for 36,750 cars with deliveries extending over a period of 5 months. The Baltimore & Ohio Railroad had ordered 300 double-door box cars from Pressed Steel Car Co., 600 of the same from Bethlehem and 500 from Harmon & Hollingsworth. The Pennsylvania Railroad is inquiring for 214 modern coaches. Reading Co. will build 100 70-ton covered hoppers at its own shop.

WITH the opening of 1946, most producers are accepting orders for extended future delivery. This means that the common practice of not receiving orders for delivery beyond July has been revised and bookings are now being accepted for as far ahead as September.

A steel strike would be felt by most steel consumers within a period of one to two weeks because inventories are not large and customers have had no opportunity to build up supplies.

The steel ingot rate this week advanced 1½ points to 83 pct of rated capacity, last week's rate having been revised to 81.5 pct. It is expected that the industry will soon complete revision of its ingot capacity figures reflecting the elimination of some obsolete equipment. While actual output may not change, the percentage of operations figure will become higher because of the drop in rated capacity after the revision is made.

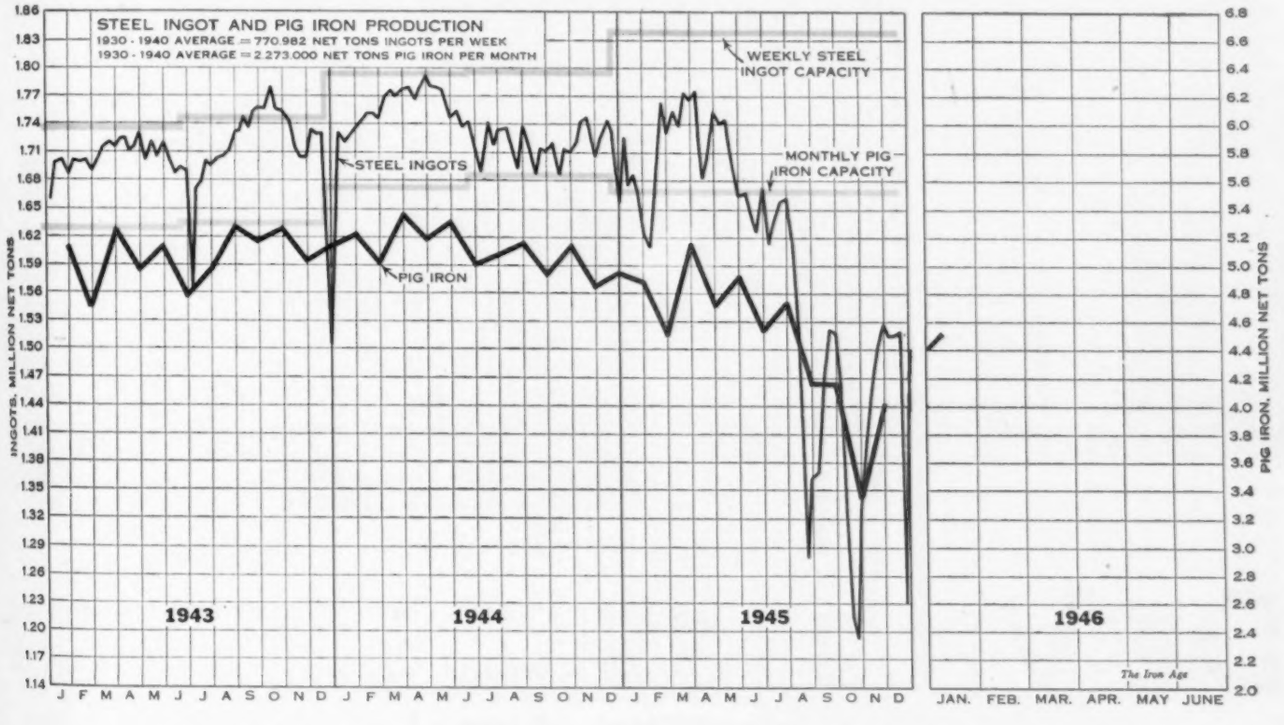
• **CORRECTION**—A transposition error in three groups occurred in the table showing steel consumption by groups for 1945 in the issue of The Iron Age, Jan. 3, p. 81. Correct figures for 1945 consumption should read: Oil and gas 2,670,079 tons or 4.8 pct of the total; pressing, stamping and forming 3,359,374 tons or 6.0 pct; and railroads 5,267,778 tons or 9.6 pct. The totals, however, are correct.

• **U. S. STEEL PRICE DEVIATION**—In June, 1938 the U. S. Steel Corp. wiped out the steel base price deviation between Pittsburgh, Chicago and Birmingham. At that time new basing points were made and the differential between the points amounting to as much as $2 to $3 a ton was dropped. Last week with no fanfare Birmingham was made a basing point for hot dipped tinplate but the price was $2 a ton higher than the price at Pittsburgh and Chicago. Although the company was noncommittal on this phase of pricing it is believed that it bears no influence on regular steel products such as sheets, bars, etc., which will, at Birmingham, be no different than at Pittsburgh and Chicago. It may be that cost of making tinplate at Birmingham is higher than at Pittsburgh and Chicago, hence the unusual deviation from what had been believed to be a general policy of the corporation. Earlier reports had the same change and differential made for electrolytic tinplate, terneplate, special manufacturing terms and blackplate. While all of these will probably be officially named at Birmingham as a basing point it is problematical whether blackplate will have a 10¢ a 100 lb differential in view of the fact that it is really a sheet product. If that change is made for that item it will cause some SNAFU in the closely knit sheet pricing setup in the South which is the same as in the North.

• **MURRAY'S DILEMMA**—While Philip Murray would not like to feel the impact of public opinion on him and his steel union because of strikes, he is trying to get raises for steelworkers before what he thinks will be a further rise in prices far above present levels. In October the Bureau of Labor cost of living index was 128.9 compared with 100.8 in January, 1941. Most important was the index of food, biggest item in workers' budgets, which in October last year had risen to 139.3 from 100.7 in January, 1941. That prices will go higher no one doubts. Murray must choose between strikes and pressure for higher wages now or cancellation of strike votes in favor of negotiations which may be long winded. To do the latter he may lose face in view of the strike vote in the steel industry—five to one. What to do is the toughest problem he has had for some time. Inside belief is that he must call his steelworkers out if for no other purpose than to exhibit strength and attempt to beat the cost of living rise.

• **BRITISH SHIPBUILDING**—Output of United Kingdom shipyards for the year 1945 is estimated at about 1,000,000 gross tons, or slightly less than the 1944 total. Orders have been flowing to the yard since the war faster than the vessels can be laid down, partly due to the fact that new orders are for tailor-made vessels, in place of the mass production for war. Backlogs are estimated to total 2,500,000 gross tons, of which 10 pct is foreign business. Hopes in the yards are that the spring will see 1,500,000 tons actually in construction.

• **PIPE ORDERS STRONG**—The pipe business is going great guns. Oil country tubular goods production schedules are filled full for the next five to six months, while there seems to be a boom in the construction of minor pipe lines. Line pipe of 6, 8, 10 and 12 in. diam. is in heavy demand, but the tonnages on any one contract are not particularly large, usually for lines under 50 miles. Butt and lapwelded pipe business is strong. Jobbers are getting good tonnages of this pipe and it is going off their shelves as fast as it appears. Some observers feel that plumbing houses, general contractors and other businesses in the building trades might be taking this opportunity to build up their own inventories. Another suggestion is that there may be a much greater program of renovation and maintenance in industrial plants, requiring large tonnages of welded pipe, than was supposed.



Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
January 1.....	77.0	87.5	80.0*	80.0	80.5*	95.0*	80.0	95.0	97.5*	54.0	80.0	70.0	98.0	81.5*
January 8.....	78.0	88.5	84.0	81.5	84.5	98.0	85.0	95.0	98.5	58.0	93.0	70.0	112.0	83.0

* Revised.

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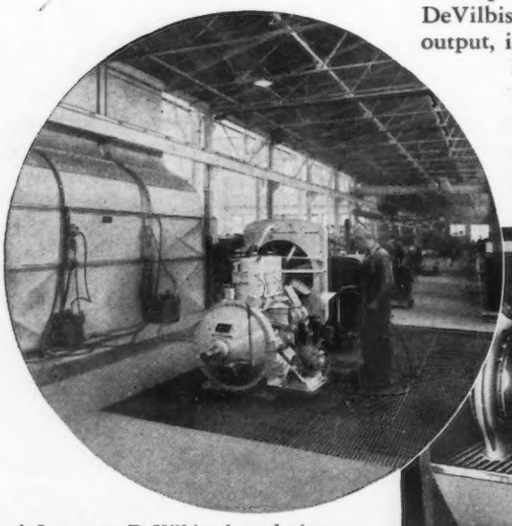
DeVilbiss Exhaust Systems are made in a great variety of types, including dry and water wash —overhead and downdraft exhaust—bench, leg, floor and tunnel types—table and canopy models—in sizes up to systems that ventilate huge rooms for spray painting airliners. They are providing the highest efficiency in painting, sanding, plating, wire brushing, chemical cleaning, degreasing and other work.

So, before you decide on any exhaust equipment, ask a DeVilbiss Engineer for his suggestions.

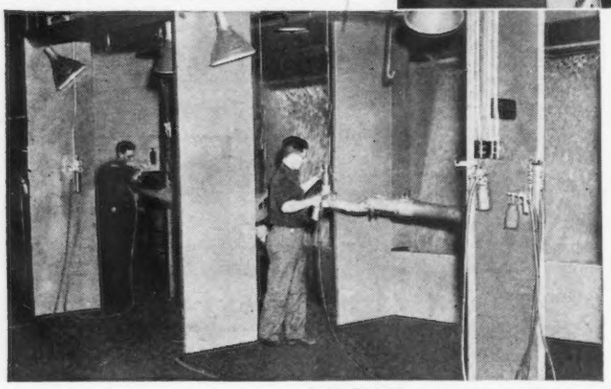
THE DEVILBISS COMPANY, TOLEDO 1, OHIO
Canadian Plant: Windsor, Ontario



A floor type DeVilbiss downdraft exhaust system used in finishing engines.

A DeVilbiss downdraft exhaust cabinet used in sanding turbosupercharger parts.

A DeVilbiss cleaning booth with filter packs used in degreasing engine parts.



A DeVilbiss water wash spray booth used in the painting of axles.

A big 4-section spray room with water wash exhaust used in paint conditioning flying boats.

DE VILBISS

means **Quality** *in all four..*

SPRAY EQUIPMENT
EXHAUST SYSTEMS
AIR COMPRESSORS
HOSE & CONNECTIONS

Steel Labor Strike Seen as Almost a Certainty

New York

• • • **Amid trial balloons** in the form of propaganda pro and con, there was nothing definite in the steel labor picture this week to indicate a revision of the USWA strike deadline for Jan. 14. The government was busy trying to get off the spot, the steel industry was busy giving its side of the picture to the public and labor was insisting that it was ready to negotiate for a $2 a day raise.

About the only thing, according to informed sources which would cause a postponement of the strike would be a healthy offer from the steel companies on which the union could base negotiations. Up to midweek such an offer had not appeared and the steel industry was already on record that it would entertain no further negotiations until the price situation was cleared up.

Lost in the shuffle of charges and counter-charges was the fact that steel companies are attempting to obtain price relief not to cover any current wage increase but to cover high costs which have accumulated over the past few years.

An OPA price adjustment would only mean that negotiations would be resumed with the tough job of arriving at an agreed upon wage boost. Judging from past experience efforts to reach such an agreement will definitely not be any one-night stand.

•

Washington

• • • **While awaiting** recommendations by the General Motors fact finding panel due this week, developments in the steel strike impasse indicated little chance of deviation from the Jan. 14 strike date set by the CIO-USWA in the wage dispute with U. S. Steel Corp.

However, with OPA reportedly standing firm on its earlier announcement that price relief would be forthcoming only after fourth quarter statements submitted by producers have been subjected to scrutiny, it is reported that union strategy may bend so as to permit a 30-day postponement. These data are expected to be submitted no later than Jan. 10.

OPA meanwhile is being subjected to terrific pressure, both from within and without government, for a "quickie" price increase. This, it is pointed out, would not afford steel companies anything like the relief needed for possible wage boosts and would require further adjustments after wage demands are reconciled. The OPA has been directed by the president to report "whether steel price increases would be proper" by Feb. 1.

The Jan. 5 appeal of the President's steel fact finding panel to the corporation and the union to resume collective bargaining remains to be acted on by the parties to the dispute.

Detroit

• • • The competitive automobile market was rocked this week when the Kaiser-Frazer Corp. promised the UAW a wage increase from 25 to 35 pct greater than standards now being paid.

When and if the contract is signed it will include a union shop and checkoff. It is understood that the base rate increase would be around 18 pct with another 10 pct coming from a $5 a car bonus pool for distribution at the end of the year.

The three-member board appointed by the President on Dec. 31 is headed as chairman by Nathan H. Feinsinger who served on the WLB panel in the Little Steel case. Other members of the board are James M. Douglas, Missouri lawyer and chief justice of the Missouri Supreme Court, and Associate Justice Roger I. McDonough of Utah who has seen service on railroad labor panels in the past.

It is understood that other integrated producers have expressed a desire to participate in the steel fact finding hearings in the Steel Corp. case. Chairman Feinsinger has indicated that extension of the board's powers which now apply only to the "steel producing subsidiaries of the U. S. Steel Corp." will be requested of the President. The board's recommendations are to be submitted by Feb. 10.

Meanwhile, the Civilian Production Administration is considering steps to be taken in the event the strike set for Jan. 14 materializes. One proposal now under consideration calls for the freezing of all steel warehouse stocks in order to prevent depletion of inventories. CPA Administrator John Small has already indicated that his agency would look out for the needs of

"We employees have been talkin' it over with the Union, chief, and if you really want a raise . . ."

Copyright, 1941, by Esquire, Inc., 919 N. Michigan Ave., Chicago, Ill. (Esquire, February 1941)

public utilities and the like, should the strike continue beyond a short time. CPA's activities would be governed by a "task force" similar to those established during the war to break production bottlenecks.

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Pittsburgh

• • • **If a general steel** strike is to be averted, some speedy steps will have to be taken and, at this late date, any plan to head off work stoppages in steel will have to come directly from President Truman. On Monday, Jan. 14, the stage is set for a walkout of the entire industry, involving, it is estimated, 750,000 CIO steel workers.

Labor officials are sitting tight on the Jan. 14 deadline for a strike, and steel officials are becoming more convinced that the strike is inevitable. The actions in the oil industry these past two weeks, where union demands are being compromised at about half of their original aims, may set a new pattern entirely for wage negotiations in other fields. Steel officials, however, feel that such a settlement in the oil industry will not have too great an effect on the steel negotiations, simply because the industry will sit tight on its price increase demands and any wage negotiations will have to hinge on what OPA does on prices.

The steel Fact Finding Board, organized last Saturday, is not expected to have any great effect on the strike. While the Board asked that some 19 other companies be included in an investigation of the impasse that has resulted between industry and labor, the fact that the dispute has ding-donged along so far without any sign of a compromise does not promise too much for the Board. Its request to U. S. Steel to resume collective bargaining fell on pretty deaf ears for the simple reason that the corporation claims its position is the same, it has nothing on which it can bargain, and, unless the Board merely wants the corporation to go through the motions, there is no sense to resumption of union-management meetings.

With 12:01 A.M., Jan. 14, the 750,000 steel workers will start their strike, the end of which may start a revolutionary process in labor-management relations and cause an upheaval in the national economy. Some sources feel that steel officials are quietly hoping that the strike will be severe enough to bring about a definite and possibly a permanent settlement, and also that steel is tacitly abetting the strike just for the purpose of finding out where industry stands, both with the Government and the public with regard to its labor relations.

USWA Ready, Murray Says

To the Chairman of Steel Fact Finding Board:

In reply to your telegram, The United Steel Workers of America stands ready, as it has been since Sept. 11, to engage in collective bargaining with representatives of the U. S. Steel Corp. regarding union's demand for $2 per day wage increase. The record shows that it has been the U. S. Steel Corp. which has not engaged in collective bargaining and which has refused two requests of the Secretary of Labor to resume such collective bargaining and to accept the services of a special mediator appointed by the Secretary of Labor.

Signed—Phillip Murray, President USWA

SIGNIFICANT: *The general strike which hit Stamford, Conn., recently when more than* 15,000 *persons jammed the downtown section in a sympathy demonstration with* 5000 *idle Yale & Towne Mfg. Co. employees visually expresses what the country will be up against next week. Close to* 2,000,000 *employees belonging to CIO units in the steel, electrical and other industries may be out on strike next week, unless some last minute development prevents the stoppages—an unlikely occurrence.*

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Union Officials Lay Plans for Conducting Orderly Steel Strike

Chicago

• • • **Tactical plans** have been laid for carrying out the steel strike in the Chicago district with all the precision of a beachhead landing—but no one is going to get hurt unless they resist—district officials of the United Steel Workers indicated at a press conference.

The general tenor of a press conference with USWA here recently was that the strike would be carried out in an orderly fashion and that full provision would be made for maintenance of equipment so that production might be resumed immediately when the strike ends. Community services also will be maintained.

"If you are looking for a violent angle, it isn't there," Ken Hunter, press representative of the union, stated.

Questioned as to the possibility of conflict with the police as in the 1937 strike, or the possibility of breaking up picket lines, Joseph Germano, director, District 31, said, "There will be no necessity for police because there will be no excessive picketing."

Mr. Germano pointed out that the union "has offered to allow operation of one or two blast furnaces at each plant on low wind." Youngstown officials say that they have not fully made up their minds as to the desirability of maintaining even such limited operations.

In addition to all necessary maintenance workers and guard forces,

Mr. Germano said that as many office workers and foremen as the companies wished would be allowed to pass through the picket lines. The union's present concern, he indicated, was to have them properly accredited. Asked why the union would allow so many people to pass the picket line, he said that this procedure "thoroughly demonstrates the responsibility of the United Steel Workers of America."

As to incoming shipments of raw material such as coal and scrap, he said, "Nothing will go in and nothing will go out." He said nothing would indicate union interference with shipment of material to destinations outside the plants, such as has been done with steel in the General Motors strike.

He estimated that the strike will affect 50 pct of all industry with effects becoming evident over a period varying from immediately to ten days following the calling of the strike.

Reviewing the question of union finances and morale, Germano and John Doherty, international representative, estimated that there is close to $1 million in the 155 local treasuries of District 31, $10 million in the local treasuries of the national union, and $5 million in the international union treasury. Ken Hunter said that morale is high in approaching the strike, most of the men "wondering why it didn't happen a long time ago."

Mr. Germano declared that at present most steel workers in the district are working 40 hr a week, some less, and a few working 48.

It was acknowledged that Wisconsin Steel Works of International Harvester Co., whose workers are not represented by the USWA, would not go on strike and that Interlake Iron Corp. at Chicago probably would not go out.

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WLB Grants Severance Pay to Displaced Workers

Washington

By DAVE ONSBORO

• • • **Five operating companies** of the United States Steel Corp. will be required to grant severance pay to employees who may be permanently displaced by closing of less efficient plants under a decision of the War Labor Board handed down Dec. 29.

The WLB simultaneously recommended severance pay to workers in 44 Lake Superior iron ore mines limited to those permanently laid off in war-exhausted mines. However, the Board denied a union request for an overall severance pay plan and ordered the issue settled through further collective bargaining. Industry members dissented in both cases.

The companies affected by the steel severance pay order include American Steel & Wire Co., Carnegie-Illinois Steel Corp., Columbia Steel Co., National Tube Co. and Tennessee Coal, Iron & Railroad Co.

The Oliver Mining Co., operators of the Holmes Mine, Ishpeming, Mich., and the Pennsylvania Iron Mining Co., owners of the East Vulcan Mines, Norway, Mich., which are operated by Pickands, Mather & Co. as agents of the Bethlehem Steel Co., are among the companies affected by the iron ore order.

In the steel case, the order provides for four weeks' pay after three or more years of service; six weeks' pay after five yr; seven weeks' pay after seven yr and eight weeks' pay after ten yr. The order also permits the companies to offer, in lieu of severance pay, substantially equivalent employment in the same general locality, with the worker to have the option of accepting one or the other. If the worker accepts other employment, his continuous service record shall be deemed to have commenced as of the date of such transfer, except that for the purpose of severance pay and vacations under the company-union agreement, his previous continuous service record shall be maintained and shall not be deemed to have been broken by the transfer.

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However, the Board's decision noted an exception to this rule whereby an employee otherwise eligible for severance pay who is entitled under seniority provisions to an equivalent job in the same plant and who is offered such a job shall not be entitled to severance pay whether he accepts or rejects the transfer. If such a transfer results directly in the permanent displacement of some other employee, the latter shall be eligible for severance pay provided he otherwise qualifies under the order.

In the event an employee having received severance pay is rehired within six months, his continuous service record shall be deemed to have commenced as of the date of his rehiring.

The order provides that any dis-

COMING EVENTS

Jan. 21-23—1946 Convention of Institute of Scrap Iron & Steel, Inc., Congress Hotel, Chicago.

Feb. 4-7—National Meeting, American Welding Society, Hotel Cleveland, Cleveland.

Feb. 4-8—National Metal Exposition, Public Auditorium, Cleveland.

Feb. 4-8—National Metal Congress, Public Auditorium, Cleveland.

Feb. 4-8—American Society for Metals, Statler Hotel, Cleveland.

Feb. 4-8—National Meeting, Iron and Steel Institute of Metals Div., American Institute of Mining and Metallurgical Engineers, Statler Hotel, Cleveland.

Feb. 6-8—American Industrial Radium and X-ray Society, Hollenden Hotel, Cleveland.

Feb. 25-28—Annual Meeting, American Institute of Mining and Metallurgical Engineers, Chicago.

Feb. 25-Mar. 1—Spring Meeting, American Society for Testing Materials, Pittsburgh.

Apr. 2-5—Packaging Exposition, sponsored by American Management Assn., Public Auditorium, Atlantic City, N. J.

Apr. 3-5—SAE National Aeronautical Meeting, Hotel New Yorker, New York.

Apr. 8-12—ASTE Exposition, Cleveland Public Auditorium, Cleveland.

Apr. 11-13—Spring Congress, Electrochemical Society, Inc., Birmingham, Ala.

Apr. 25-26—Twenty-ninth AIME Annual Open-Hearth Steel and Blast Furnace and Raw Materials Conferences, Chicago.

June 24-28—Forty-ninth Annual Meeting, American Society for Testing Materials, Buffalo.

pute between the parties concerning its interpretation or application shall be determined by arbitration.

The steel order supplements a previous WLB order of Nov. 25, 1944, which approved the principle of severance pay but referred the specific terms back to the parties for further collective bargaining. Subsequently, on Oct. 9, 1945, the United Steelworkers of America petitioned the Board to settle the issue and a public hearing was held on Nov. 19. The Board was notified a short time ago that a final attempt at negotiation had failed.

Recalling the guideposts established in the original decisions, the Board reiterated the belief that it would be fair and equitable for the companies to devote a portion of the benefits derived through reduced production costs to a severance payment to displaced workers and that such payments would be consonant with the carryback provisions of the tax laws. The Board also pointed out that particular regard should be given to workers comprising the regular force rather than employees who entered the industry for temporary war service only.

In the original iron ore case which involved workers producing approximately 80 pct of the iron ore mined in the country, the Board, on March 23, 1945, referred the issue back to the parties and when the negotiations stalemated conducted a hearing Nov. 20. As distinguished from the steel case, no conclusion on the principle of severance pay had previously been reached.

The severance pay schedule adopted in the iron ore case was identical with that adopted by the Board in the steel case.

Commenting on the exceptional circumstances which exist with respect to displaced mining employees, the majority opinion declared that some appropriate form of adjustment by the companies was warranted. However, the Board declined to prescribe a long-range program because of the varied character of the problems involved and the essentially wartime functions of the Board itself. In remanding the issue for settlement through collective bargaining, the Board emphasized that its action should not be construed as evidencing an indifference to the equities involved but, on the contrary, as underscoring the importance of the problem.

The exceptional cases in which severance pay was granted, the opinion pointed out, were those where accelerated production due to war demands have resulted in premature depletion and consequent displacement of employees who cannot, by exercise or seniority rights, claim and obtain equivalent jobs with the same company. The Board added that there was considerable merit to the Union's contention that, under such circumstances, an employee by aiding his employer to increase production above the normally anticipated rate, has worked himself out of a job. The opinion also took into consideration that closing of a mine due to depletion does not mean loss of business or profit but rather transfer of production to other mines.

The Board's steel order prescribed that a week's severance allowance shall be computed by multiplying the average weekly hours (no less than 40) scheduled in the particular plant in the last 24 weeks prior to his severance by the average hourly earnings of the employee during that period.

In the case of the iron ore mining companies, the allowance shall be computed by multiplying the average weekly hours scheduled in the particular mine during a representative period prior to the employee's severance by his hourly earnings during that period.

The union in both cases had requested four week's severance pay for employees with one to three years of service, and eight weeks' pay for employees with three years or more of service.

A ROSE BY ANY OTHER NAME: *Obliged to drop the WPB, the President has substituted for it the National Wage Stabilization Board. Members are shown at a recent meeting in Wash., D. C.: seated left to right, E. N. Cannon, industry; S. Garrett and W. W. Wintz, public; R. J. Watt, AFL; C. J. Shipley, CIO. Standing, left to right, J. D. Marshall and C. Barrett, alternate industry representatives; J. H. Leonard and W. Mason, alternate AFL representatives; and D. R. Stewart, alternate CIO representative.*

Fire Destroys Plant Of Allegheny-Ludlum

Pittsburgh

• • • **A fire, caused** by sparks from a spot welder igniting baled paper, destroyed the West Leechburg plant of Allegheny-Ludlum Steel Corp. on Jan. 3, and resulted in damages estimated at $250,000. Spreading quickly from the source, the fire destroyed stores of emery belts valued at $50,000 and about 14 strip polishing machines.

The building that housed the strip polishing operation was, in itself, destroyed, and it is estimated that some 140 people will be out of work for some time.

Heads AFA Gray Iron Div.

Mt. Vernon, Ohio

• • • **T. E. Eagan,** chief metallurgist of The Cooper-Bessemer Corp., has been appointed chairman of the Gray Iron Div. of the American Foundrymen's Assn.

Mr. Eagan, whose headquarters are in the Grove City, Pa. plant, is also chairman of the Mahoning Valley chapter of the American Society for Metal.

C. A. Musselman, Chilton Board Chairman, Dies

• • • **C. A. Musselman,** chairman of the board of the Chilton Co., publishers of THE IRON AGE, died Jan. 3 at the Presbyterian Hospital, Philadelphia, after a long illness. He was 73 yr of age.

He served the publishing company in many official capacities, having been secretary and treasurer from 1901 until 1923 when he became president of the automotive unit. He was elected president of the company in 1934, retiring from that post in June 1945, to become chairman of the board. He was succeeded as president by Joseph S. Hildreth.

Active for many years in both the automotive and publishing fields, he was a member of the Society of Automotive Engineers and had served as president of the Associated Business Papers and as a member of the board of the National Publishers Assn. He was also a member of the Union League, the Philadelphia Country Club and the Poor Richard Club.

OPA Grants Price Increases On 1945 Lake Superior Iron Ores

Washington

• • • **Ceiling prices for** Lake Superior iron ores have been increased 10¢ per gross ton for Mesabi ores and 20¢ for Old Range ores by OPA. The increases for these ores were made effective for the entire shipping season of 1945 under an order issued in 1944 which allowed the industry to quote prices subject to adjustment by the pricing agency.

Under the new ceiling, based on Lower Lake delivery, the price of 51.50 pct Mesabi non-bessemer was raised 10¢ to $4.55; Mesabi bessemer was increased 10¢ to $4.70; Old Range non-bessemer was increased 20¢ to $4.80; Old Range bessemer was increased 20¢ to $4.95 and high phosphorus was raised 20¢ to $4.55.

Among special ores, the ceiling prices of manganiferous and siliceous ores were increased 20¢. Lump ore also was increased 20¢.

In carrying out its obligations under the Price Control Act, OPA said that it followed the overall earnings standard as a primary guide for determining whether established maximum prices meet statutory requirements.

Ordinarily in such cases OPA raises ceiling prices only to the extent necessary to raise an industry to its level of profits in the peacetime years 1936-1939. In the case of the Lake Superior iron ore industry, the Price Administrator found that current profits of the industry were so abnormally concentrated in one company that a modification of the usual standard was required to establish prices which were "generally fair and equitable."

"Whenever possible, such an adjustment should be made in a manner which will concentrate its benefits in those firms currently earning less than they did in the base period," OPA said.

The price agency found from its financial studies that underground mining operations were being carried on at a loss. These mines furnished the bulk of the merchant ore in the base period.

Greater increases were allowed to the underground mines for these reasons, according to OPA.

The increased ceiling prices apply only to ore mined for sale. In 1944 the mines in the Lake Superior region produced 82 million tons of ore. Only 19 million tons of this ore was for sale. The remaining 63 million tons was mined by the steel mills for use in company-owned blast furnaces and is not sold subject to ceiling prices.

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Price Increase Grant Held Inadequate By Iron Ore Industry

Cleveland

• • • **Spokesmen for the** iron ore industry branded the OPA grant "inadequate," citing the case of the underground mines which in 1945 lost on an average of 25c. a ton. Amply evidenced by the annual report of the Michigan State Mine Appraiser which showed that average costs of labor and materials alone have increased 53c. a ton in four years (1940-1944) and overall costs 60c. a ton during that period.

A parallel situation spokesmen pointed out, exists in Minnesota, where the State Mines Directory shows figures through 1943 indicating that labor costs in underground mines and combination underground and open pit (exclusive of entirely open pit) operations had risen during the 1940-1943 period a total of 47c. a ton for labor and supplies only, and predicted that the 1944-1945 rise will be proportionate when figures are available and will probably show about a 16c. a ton increase a year if not more.

(During the 1940-43 period the increases were: 10c. the first year,

25c. the second and 12c. the third.)

In the open pit mines, an increase of 13c. a ton in labor and supplies during the 3-yr period was indicated, and trade sources declared that costs had probably gone up 25c. a ton during 1944-45, or double the original amount. One source asserted that while the big shipping pits are the money-makers, some of the open pits or beneficiating pits where a good part of the ore after mining has to be beneficiated, which means double handling and mining a ton and a half to get a ton, operate on a pretty slim margin.

New Type Stainless Steel Developed

Pittsburgh

• • • **Carnegie-Illinois Steel Corp.,** United States Steel Corp. subsidiary, announces the release from war restrictions of Stainless "W"*, a new heat-treatable stainless steel of the 18-8 type which makes available the high strength and corrosion resistance of 18-8 in all wrought and cast forms, regardless of size or shape. In this new steel, developed and now made public for the first time, the basic composition is so balanced as to insure, without the necessity of cold working, the approximate completion of the austenite-to-ferrite (martensite) transformation and the subsequent process of precipitation hardening.

* *Covered by U. S. Patents* 2,381,416, 2,374,388 *and others pending.*

In the annealed condition Stainless "W" ordinarily has a hardness of 22 to 28 Rc, a tensile strength of 120,000 to 150,000 psi and a yield strength of 75,000 to 115,000 psi. By proper heat treatment the hardness can be raised to 39 to 47 Rc, the tensile strength to 195,000 to 225,000 psi with a yield strength of 180,000 to 210,000 psi.

A typical analysis of Stainless "W" is as follows: C-0.07, Mn-0.50, P-0.01, S-0.01, Si-0.50, Ni-7.00, Cr-17.00, Ti-0.70, Al-0.20, and balance Fe.

The most important element is titanium, which serves the dual purpose of being the primary precipitation hardening element and a strong ferrite former. With all other elements properly balanced, the optimum percentage of titanium has been found to be in the range of 0.40 to 1.00 pct. In melting the material, aluminum is added to the bath primarily as a deoxidizer. The excess that remains in solid solution serves to augment the titanium in the precipitation hardening role. Carbon does not contribute directly to the precipitation hardening reaction, as do the other preceding elements, but it serves to control the amount of soluble titanium that will be available for the reaction. Nitrogen behaves in much the same manner as carbon because it also combines with, and thus immobilizes, the titanium. It also stabilizes the austenite and therefore should be controlled and held as low as possible (to residual amounts).

The remaining alloying elements, nickel, manganese, chromium and silicon, serve to control the austenite-to-ferrite balance; the first two elements are austenite formers while the latter two are ferrite formers. It is believed that these elements, with the possible exception of nickel, do not enter into the precipitation hardening reaction. Columbium has been successfully substituted for titanium to produce precipitation hardening.

Solution annealing serves to put the precipitation hardening constituents of Stainless "W" into solid solution in austenite, which upon cooling to room temperature transforms into ferrite, which is then supersaturated with the precipitation hardening constituent.

The solution annealing temperature range for Stainless "W" begins at about 1200° F, which is 100° to 200° F above the temperature at which the material begins to transform to austenite, and extends to approximately 2000° F. With increasing solution annealing temperature, the hardness and yield strength of the unaged material increases slightly and passes over a peak at about 1700° F to 2000° F, while the corresponding tensile strength simultaneously reaches a minimum value at about 1600° F, and then increases slightly with increasing temperature. Usually the minimum holding time at temperature is short, and on thin sections 5 min at the higher annealing temperatures (1850° to 1950° F) has been found satisfactory.

Precipitation hardening (aging) takes place over the approximate temperature range of 500° to 1050° F. Three specific temperatures are recommended for their different combination of properties. Of these, 950° F gives the maximum tensile and yield strengths, but with the lowest ductility, while 1000° F gives a slightly lower tensile and yield strength with an improved ductility. Aging at 1050° F results in the formation of some austenite which improves the ductility, but at some sacrifice in tensile and yield strengths.

Many applications are foreseen for this new steel, particularly in bar form. It is producible in all forms for commercial use, and of particular interest is the fact that it exhibits considerably less directional properties than cold-worked 18-8. Although this new steel is stiff to work, it can be subjected to drawing operations and given an intermediate anneal as often as desired in the course of deep drawing and then heat treated to develop the desired high physical properties in the whole piece.

It is readily fabricated by spot welding and high joint efficiencies can be secured by metallic arc, atomic hydrogen and heli-arc welding operations, particularly when solution annealing followed by aging is employed as a postwelding treatment. Machinability is slightly better than that of austenitic 18-8 stainless steel and Stainless "W" is strongly magnetic.

Stainless "W" can be rolled into billets, bars, sheets or shapes, drawn into wire or pierced for tubing, or it may be forged as desired into any shape or size, the finished product being amenable to heat treatment to develop the desired hardness in addition to corrosion resistance superior to that of the heat-treatable straight chromium steels and approximately the same as that of 18-8 stainless steels in most corrosive media.

Cold Metal Settles Patent Infringement Claims

Cleveland

• • • **Cold Metal Process Co.** infringement suit against seven companies resulted in a $9,600,000 settlement here last week which is being impounded by the federal court. Payments reported made were: American Rolling Mill Co., $2,407,500; Bethlehem Steel Co., $2,132,100; Jones & Laughlin Steel Corp., $1,380,600; Wheeling Steel Corp., $1,643,400; Youngstown Sheet & Tube Co., $1,235,700; Inland Steel Co., $600,000; Crown Cork & Seal Co., $200,000.

Deposit of the money was in compliance with a federal court order that royalties due the Cold Metal Process Co. be impounded pending the ultimate decision in the suit of the government against the company charging that some of its patents were fraudulently obtained. An appeal was filed by the Department of Justice last Sept. 27.

The Cold Metal Process Co., received a $3,850,000 settlement from Carnegie-Illinois Steel Corp. in 1940 and 1941. As a result, in 1941 the company paid a $500 dividend on the $50 par value stock. Since the Cold Metal Process Co. has been charging royalties ranging from 50¢ to $1 a ton on the carbon steel and up to $35 to $40 a ton on some of the high-grade alloy steels rolled under the patents, a considerable amount of money will probably be involved in the other infringement suits.

Reports are that the Circuit Court of Appeals case involving the Cold Metal Process Co. may be heard in May but more probably in October. The court does not hear cases during the summer months. Competent observers believe that regardless of the outcome of the Circuit Court of Appeals case a further appeal will be made to the Supreme Court.

Some observers believe that last week's action will lead to settlements with more than 25 other steel companies against which Cold Metal Process Co. has infringement suits pending, in the immediate future. At the same time, stock of Bessemer Securities Co., which owns 200 shares of Cold Metal Process Stock, rose from $22.50 to $24 a share.

Cold Metal Process Co. was formed in 1926, with 2000 shares of $50 par value stock, to handle the patents. Abram P. Steckel, after whom the process was named and who still owns a considerable amount of the stock, served as the first president. Some time later Mr. Steckel was replaced by L. A. Beeghly, president of the Standard Slag Co. and an important stockholder in Cold Metal Process Co.

Suit to cancel two of the patents covering the Cold Process granted in 1930 was brought by the Dept. of Justice against the Cold Metal Process Co., and Abram P. Steckel in 1943. Hearing of testimony began in November, 1944, before Judge Shackleford Miller, Jr., who last August ruled against the government. The Department of Justice appealed, and the litigation is now in the United States Circuit Court of Appeals.

In reviewing the case Judge Miller pointed out that on June 30, 1923, Mr. Steckel (who studied electrical engineering in Eugene Grace's class at Lehigh—Ed. note) filed application for a patent on what is commonly called a "4-high" mill. Mr. Steckel made his claimed invention in 1922 and built (in a Youngstown garage—Ed. note) and operated his first mill in that year. Steel rolled on the Steckel mill was sold during 1923 and 1926 and the proceeds from these sales amounted to approximately $13,000. After the Cold Metal Process Co. was organized in 1926, it adopted a policy of showing the mill generally to the public and granting license to others.

About 50 pct of the total rolling capacity of the industry has taken licenses and are operating accordingly, paying substantial royalties to Cold Metal. Adoption of the Steckel mill was gradual, but by 1937 most of the old pack-rolling sheet mills had been discarded in favor of the patented mills. Licensees included Carnegie-Illinois Steel Corp., and other U. S. Steel Corp. subsidiaries, National Steel Corp., Inland Steel Co., Allegheny Ludlum Steel Corp. and a number of small producers. (Licenses have been granted to the steel companies under approximately 25 Cold Metal Process Co. patents, according to Howard F. Burns, of Baker, Hostetler & Patterson, counsel for the company.)

Mr. Steckel's patent No. 1,774,016 was issued to the Cold Metal Process Co. on Jan. 14, 1930, covering a new cold-rolling process for light-gage sheet and strip previously produced by hot rolling in packs, notably tinplate, which permitted rolls to be driven principally by the tension on the delivered strip, allowing the strip to be rolled at high speed along with saving considerable power in the mill drives. This patent was directed to an entirely different invention than patent No. 1,779,195, and its claims were not involved in an agreement between Cold Metal Process Co. and United Engineering & Foundry Co. A contributing factor to the allowance of this patent was Mr. Steckel's representation that he was the first in the history of cold rolling to effect reduction after reduction of steel without intermediate annealing.

MILES OF TUBES: *An inspector checks some of the six miles of tubes inside The Studebaker Corp.'s new steam generator which produces 210,000 lb of steam per hr. Illustrative of its size, the automatically-stoked furnace heating these tubes consumes 12 to 15 tons of coal an hr.*

Wartime Steel Expansion Costs to June 30, 1945

Industry	Industry Financed	Government Financed	Total
Integrated steel Co.'s	$ 938,184,784	$ 796,633,855	$1,734,818,639
Semi-integrated steel Co.'s	66,616,836	84,546,590	151,163,426
Non-integrated steel Co.'s	32,554,889	9,705,680	42,260,569
Independent ore Co.'s	29,004,034	3,382,000	32,386,034
Independent or water transportation Co.'s	24,510,012	.....	24,510,012
Independent blast furnace Co.'s	11,836,487	37,586,415	49,422,902
Independent steel warehouse Co.'s	2,225,936	.....	2,225,936
Total Steel Industry	$1,104,932,978	$931,854,540	$2,036,787,518
Independent coal-coke Co.'s	12,011,282	1,405,579	13,416,861
Refractory and flux Co.'s	11,961,206	2,395,521	14,356,727
Independent ingot mould Co.'s	2,329,034	.....	2,329,034
Iron and steel scrap Co.'s	910,708	1,336,007	2,246,715
Total Steel Auxiliary Industry	$27,212,230	$5,137,107	$32,349,337
Independent steel casting Co.'s	51,784,460	141,814,000	193,598,460
Independent gray iron casting Co.'s	18,588,373	8,037,614	26,625,987
Independent malleable iron casting Co.'s	15,798,066	13,874,407	29,672,473
Total Foundry Industry	$86,170,899	$163,726,021	$249,896,920
Integrated forging Co.'s	21,136,973	67,264,251	88,401,224
Non-integrated forging Co.'s	29,999,770	74,818,811	104,818,581
Total Forging Industry	$51,136,743	$142,083,062	$193,219,805
Ferroalloy Co.'s	90,363,961	78,350,646	168,714,607
Miscellaneous Co.'s	344,927	211,552	556,479
Grand Total	$1,360,161,738	$1,321,362,928	$2,681,524,666

Costs of Wartime Projects in Ferroalloy Industry to June 30, 1945

Product	Industry Financed	Government Financed	Total Cost
Chrome	$13,136,080	$13,526,634	$26,662,714
Cobalt	2,113,233	.....	2,113,233
Manganese	4,624,575	9,004,052	13,628,627
Molybdenum	4,903,670	.....	4,903,670
Nickel	40,596,690	35,559,500	76,156,190
Silicon iron	15,364,016	7,278,531	22,642,547
Tantalum	.....	5,363,919	5,363,919
Titanium	1,093,092	.....	1,093,092
Tungsten	4,491,363	1,106,778	5,598,141
Vanadium	2,156,719	4,594,193	6,750,912
Miscellaneous	1,884,523	1,917,039	3,801,562
Total	$90,363,961	$78,350,646	$168,714,607

Wartime Steel Records Revised; Show Mid-1945 Trade Status

Washington

• • • **Supplementing the** original report by WPB's Steel Div. on steel industry expansion for war up to June 30, 1944, it has been revealed that as of June 30, 1945, ingot capacity has been expanded during the war by 15.35 million, net tons, blast furnace capacity by 15.73 million tons, sinter capacity by 11.5 million tons and coke capacity by 13.41 million tons.

Investment in expanded war capacity totals $2.6 billions as of mid-1945, split about evenly between industry-financed and government-financed facilities.

In analyzing the costs of industry-financed facilities, it is apparent that the largest expenditures have gone into finishing facilities — $217.9 million, rolling mills and facilities—$185.5 million and blast furnace capacity—$116.7 million. Other major items of expenditure for the industry during the war have been for mines, coke producing and service facilities. Nearly 90 pct of the industry investment in wartime steel capacity originated in the integrated steel companies with a total investment of $938,184,784 to mid-1945.

Cost of Steel-Industry-Financed Wartime Projects to June 30, 1945

Kind of Facilities	Integrated Steel Companies	Semi-Integrated Steel Companies	Non-Integrated Steel Companies	Independent Ore Companies	Independent Ore Water Transportation Companies	Independent Blast Furnace Companies	Independent Steel Warehouse Companies	Total Cost Steel Industry
Iron mine	$65,160,533	$.....	$.....	$29,004,034	$.....	$ 2,880,625	$.....	$ 97,045,192
Ore treatment	17,228,814	.....	.....	.....	.....	808,526	.....	18,037,340
Water transportation	33,517,923	.....	.....	.....	24,510,012	.....	.....	58,027,925
Raw material	11,469,552	.....	.....	.....	.....	.....	.....	11,469,552
Coal mining	51,768,174	.....	.....	.....	.....	1,152,628	.....	52,920,802
Coal washing	12,929,835	.....	.....	.....	.....	.....	.....	12,929,835
Coke	84,890,393	.....	.....	.....	.....	2,732,623	.....	87,623,016
Flux	6,293,134	.....	.....	.....	.....	25,959	.....	6,319,093
Pig iron and ferromanganese	113,492,407	.....	.....	.....	.....	3,220,052	.....	116,712,459
Bessemer furnace	3,132,626	.....	.....	.....	.....	.....	.....	3,132,626
Openhearth furnaces and facilities	61,394,924	2,137,031	.....	.....	.....	.....	.....	63,531,955
Electric furnaces and facilities	10,069,682	8,545,779	.....	.....	.....	.....	.....	18,615,461
Rolling mills and facilities	167,857,257	17,460,069	181,422	.....	.....	.....	.....	185,498,748
Finishing	165,233,583	21,010,034	32,373,467	.....	.....	.....	.....	217,911,062
Steel casting	842,296	471,067	.....	.....	.....	.....	.....	1,313,363
Gray iron casting	1,235,527	.....	.....	.....	.....	.....	.....	1,235,527
Drop forging	2,315,786	41,506	.....	.....	.....	.....	.....	2,357,292
Heavy forging	16,572,144	620,401	.....	.....	.....	.....	.....	17,192,545
Service	80,939,732	9,280,842	.....	.....	.....	820,170	.....	91,072,328
Miscellaneous	27,242,545	6,859,036	.....	.....	.....	195,904	.....	34,971,923
Warehouse	4,597,917	191,071	.....	.....	.....	.....	2,225,936	7,014,924
Total	$938,184,784	$66,616,836	$32,554,889	$29,004,034	$24,510,012	$11,836,487	$2,225,936	$1,104,932,978

Wartime Increase in Openhearth Ingot Capacity to June 30, 1945
(in net tons)

Companies	State Location	Industry Financed		Government Financed		Total Increase
		From Hot Metal	From Furnaces	From Hot Metal	From Furnaces	
Integrated Steel Companies:						
American Rolling Mill Co.	Missouri	.....	60,000	.....	.....	60,000
American Rolling Mill Co.	Texas	.....	207,000	101,607	203,213	511,820
Bethlehem Steel Co.	California	.....	50,000	.....	.....	50,000
Bethlehem Steel Co	Maryland	.....	538,000	.....	.....	538 000
Bethlehem Steel Co.	Pennsylvania	.....	228,000	.....	300,000	528,000
Bethlehem Steel Co.	Washington	.....	42,000	.....	.....	42,000
Crucible Steel Co. of America	New Jersey	.....	31,750	.....	.....	31,750
Crucible Steel Co. of America	Pennsylvania	.....	27 408	.....	.....	27,408
Geneva Steel Co.	Utah	.....	.....	.....	1,283,400	1,283,400
Inland Steel Co.	Indiana	111,000	.....	85,000	.....	196,000
International Harvester Co.	Illinois	.....	256,600	.....	.....	256,600
Kaiser Co., Inc.	California	.....	720,000	.....	.....	720,000
National Steel Co.	Michigan	216,000	.....	.....	.....	216,000
Nationa Steel Co.	West Virginia	349,150	.....	.....	.....	349,150
Pittsburgh Steel Co.	Pennsylvania	.....	.....	100,000	.....	100,000
Republic Steel Corp.	Alabama	.....	43,100	120,000	.....	163,100
Republic Steel Corp.	Illinois	.....	.....	.....	540,000	540,000
Republic Steel Corp.	New York	.....	87,000	.....	.....	87,000
Republic Steel Corp.	Ohio	40,000	234,900	340,000	.....	614,900
United States Steel Corp.	Alabama	418,000	.....	.....	.....	418,000
United States Steel Corp.	California	.....	720,200	.....	.....	72,200
United States Steel Corp.	Illinois	.....	301,500	.....	.....	301,500
United States Stee Corp.	Indiana	.....	375,500	.....	.....	375,500
United States Steel Corp.	Massachusetts	.....	67,000	.....	.....	67,000
United States Steel Corp.	Minnesota	.....	274,400	.....	.....	274,400
United States Steel Corp.	Ohio	.....	165,000	.....	.....	165,000
United States Steel Corp.	Pennsylvania	.....	1,217,000	.....	1,700,000	2,917,000
Youngstown Sheet & Tube Co.	Indiana	.....	96,000	.....	.....	96,000
Total		1,134,150	5 094 358	746,607	4 026,613	11,001,728
Semi-Integrated Steel Companies:						
A. M. Byers Co.	Pennsylvania	.....	36,000	.....	.....	36,000
Continental Steel Corp.	Indiana	.....	30,000	.....	.....	30 000
Granite City Steel Co.	Illinois	.....	.....	.....	390,000	390,000
Laclede Steel Co.	Illinois	.....	43,025	.....	.....	43,025
Phoenix Iron Co.	Pennsylvania	.....	50,000	.....	.....	50,000
Worth Steel Co.	Delaware	.....	67,200	.....	.....	67,200
Total		.....	226,225	.....	390,000	616,225
Integrated Forging Companies:						
American Locomotive Co.	Illinois	.....	79,369	.....	.....	79,369
American Locomotive Co.	Pennsylvania	.....	20,160	.....	.....	20,160
Barium Stainless Steel Corp.	Ohio	.....	.....	.....	35,000	35,000
Kilby Steel Co.	Alabama	.....	48,000	.....	.....	48,000
Midvale Co.	Pennsylvania	.....	.....	.....	60,000	60,000
United Engineering & Fdry. Co.	Pennsylvania	.....	.....	.....	72,000	72,000
Total		.....	147,529	.....	167,000	314,529
Grand Total		1,134,150	5,468,112	746,607	4,583,613	11,932,482

Wartime Steel Expansion in Net Tons to June 30, 1945

Basic Capacity	Industry Financed	Government Financed	Total
Ingot Capacity			
Integrated steel Co.'s	7,190,648	5,737,420	12,928,068
Semi-integrated steel Co.'s	1,046,885	905,040	1,951,925
Integrated forging Co.'s	176,529	297,000	473,529
Total	8,414,062	6,939,460	15,353,522
Blast Furnace Capacity			
Integrated steel Co.'s	8,281,984	5,886,000	14,167,984
Independent blast furnace Co.'s	504,080	1,066,000	1,570,080
Total	8,786,064	6,952,000	15,738,064
Sinter Capacity			
Integrated steel Co.'s	6,123,200	4,637,400	10,760,600
Independent blast furnace Co.'s	390,000	350,000	740,000
Total	6,513,200	4,987,400	11,500,600
Coke Capacity			
Integrated steel Co.'s	7,298,700	4,109,100	11,407,800
Independent blast furnace Co.'s	91,440	690,000	781,440
Independent coke and coal Co.'s	1,018,006	75,000	1,093,006
Ferroalloy Co.'s	.....	128,400	128,400
Total	8,408,146	5,002,500	13,410,646

Wage Stabilization Board Established To Review Increases

Washington

• • • **Powers and functions** of the defunct National War Labor Board as related to the stabilization of wages and salaries under the 1942 Price Control Act were transferred to the Dept. of Labor by an executive order issued Jan. 3.

At the same time, a new organization designated as the National Wage Stabilization Board was established to administer the remaining functions which mainly consist of reviewing proposed wage increases involving possible price boosts and certifying those approved to OPA. Those denied may not be considered by OPA in making future price adjustments.

The new board, which is chairmaned by W. Willard Wirtz, consists of six members appointed by the President. There are two public members, two industry members and two labor members on the Board. Mr. Wirtz was formerly connected with WLB.

The Wage Adjustment Board for the building and construction industry, under the executive order, continues to perform its present functions with respect to that industry.

The President directed that any dispute cases on which final action may not have been taken by WLB prior to its termination shall be returned to the parties.

Other WLB powers and functions assumed by the new board include the continued operation of tripartite commissions established to carry out WLB directive orders relating to the steel, textile and meat-packing industries. The Board will also appoint arbitrators needed under WLB orders or collective bargaining agreements.

Under the new set-up, the Board will approve wage increases (1) to compensate for higher living costs where straight time average hourly earnings have been increased less than 33 pct which is the estimated cost of living rise; (2) to correct inequities; (3) to break manpower bottlenecks. Voluntary wage hikes not requiring price increases need not be submitted.

Industrial Briefs...

• REPRESENTATIVES — The Forker Corp., Cleveland, has recently announced the following new sales representatives: Ohio Mechanical Handling Co., 1856 S. Main St., Akron, Ohio; Samuel G. Boyd, 1277 Cumberland Rd., NE, Atlanta, Ga.; Robert Abel, Inc., 44 School St., Boston.

• KINGSFORD FOUNDRY — Grede Foundries, Inc., Milwaukee, and the Lake Shore Engineering Co., Iron Mountain and Marquette, Mich., will be joint operators of a new combined foundry and machine shop to be erected at Kingston, Mich.

• CHANGES NAME—Fisher Iron & Metal Co., Muskegon, Mich., announce that they have changed their corporate name to Fisher Steel & Supply Co. There will be no change in the personnel, policies or finances of the company.

• SELLS FOUNDRY—H. K. Porter Co., Inc., has announced the sale of the car wheel foundry of its subsidiary, the Mt. Vernon Car Mfg. Co. at Mt. Vernon, Ill.

• NEW ENGINEERING FIRM—A new engineering organization, known as Central States Engineering Corp., has been announced by its organizers. E. M. Beyma has been made president and general manager; John Allmon, vice-president and chief engineer; and Frank Querry, secretary-treasurer. The offices are located at 4612 Woodward Ave., Detroit.

• EXPANDS 50 PCT—Progressive Welder Co., Detroit, is expanding its plant floor space by approximately 50 pct. The new facilities include an adjacent factory and about 10,000 sq ft of new construction joining the two buildings.

• MOWER DIV. — Reo Motors, Inc., Lansing, Mich., has established a new Lawn Mower Div. which is introducing two new mowers for general sale. One is a 17 in. unit called the Michigan Noiseless, the other is a 21 in. powered model called the Trimalawn Power Mower.

• ACQUISITION — A group of steel men have announced the acquisition of the Crum Lynn Foundry at Chester, Pa., built by the RFC and operated by the Atlantic Steel Casting Co. during the war. The new company, which is now in full operation and is known as the Chester Electric Steel Co., will specialize in carbon alloy and stainless steel castings, and will be headed by Fred Grotts, president of Fort Pitt Steel Casting Co. since 1939.

• NEW QUARTERS — Operations of the Stewart Industrial Div. of Chicago Flexible Shaft Co. have been moved from the main Chicago Flexible plant to a recently acquired building at 4433 Ogden Ave.

• GAGE DIV. MOVES — Helicoid Gage Div. of American Chain & Cable Co., Inc., has been moved from Long Island City, N. Y., to Bridgeport, Conn.

• BUYS NEW PLANT—The Brass Goods Mfg. Co., Brooklyn, has announced the sale of its Brooklyn plant and the purchase of a new plant in Deep River, Conn. The new plant is a modern one-story concrete building with 85,000 sq ft of productive floor area, exclusive of office. In addition to the plant there are 8½ acres of ground.

• CONLON BUYS — The Conlon Corp., Chicago, has purchased control of the Moore Corp., Joliet, Ill.

• SCREW FIRM EXPANDS—Cleveland Cap Screw Co. has begun the first of a three-unit expansion and improvement program that will cost approximately a half million dollars and which will enable the company to maintain a larger inventory of carbon and alloy steels and assure ample raw materials.

ICC Postpones Coal Freight Reductions

Washington

• • • **Acting upon petitions** by railroads for reopening of the case, the Interstate Commerce Commission has postponed from Feb. 1 to March 1 the effective date of reduced rates on bituminous coal from Western Pennsylvania to the Youngstown district. Intervening petitions also were filed by steel and coal companies.

The order establishing the lower rates was issued on Oct. 2, 1945. It reduced the rate from Pittsburgh district from $1.44 to $1.37 per net ton; the rate from Indianola and Russellton in the Freeport district from $1.44 to $1.32; the rate from Leetonia district from 94¢ to 89¢, and the ex-river rate from Conway and Colona from 90¢ to 80¢.

One of the principal points made by the railroads was the contention that the Commission erred in giving weight to the alleged favorable transportation conditions incident to the carriage of coal from the two mines of the Republic Steel Corp. at Indianola and Russellton. It was declared that the evidence did not establish the fact that the conditions warranted special treatment and that reductions from these mines would cause deductions at many destinations not included.

The intervening petitions of the Youngstown Sheet & Tube Co. and the Western Coal Operators Assn. were identical in part. They took issue with the Commission's statement that its conclusions were substantially the same as those of the examiners. It was declared that it was not necessary to go beyond the report of the Commission for ample justification of an all-rail rate from Pittsburgh and Freeport to Youngstown not exceeding 1.20.

The Carnegie-Illinois Steel Corp. and the Frick Coke Co., U. S. Steel Corp. subsidiaries, said that they have neither sought nor approved rate reductions but urged that the present relationship be preserved in rate reductions. These interveners declared that they will be seriously injured if the rates from the mines of the Republic Steel Corp. in the Freeport district are made lower than the rates from the Frick mines in the Pittsburgh district to the Carnegie-Illinois mills in Youngstown.

Construction Steel . . .

New York

• • • **Fabricated steel awards** this week included the following:

15,000 Tons, Terminal Island, Cal., bridge at Roosevelt Navy Base, to Bethlehem, Pacific Coast Corp.

6300 Tons, Van Nuys, Calif., General Motors Chevrolet plant, to Bethlehem Pacific Coast Corp.

1700 Tons, Vernon, Calif., assembly and parts plant Ford Motor Co., to Bethlehem Pacific Coast Corp.

1700 Tons, Brawley, Calif., Holly Sugar Co. plant to Consolidated Steel Corp.

1000 Tons, Newark, Ohio, warehouse, through Austin Co., contractor to Ingalls Iron Works Co.

775 Tons, Detroit, Mich., shipping and bottling building for Pfeiffer Brewing Co., to Whitehead & Kales, Detroit.

700 Tons, Mattoon, Ill., General Electric Co. manufacturing and office building to Lee C. Moore.

430 Tons, Long Beach, Calif., plant for Ohio Rubber Co., to Bethlehem Pacific Coast Corp.

400 Tons, Marysville, Calif., Feather River highway crossing, to Western Pipe & Steel Co.

354 Tons, San Jose, Calif., J. C. Penney Co. building, to Bethlehem Pacific Coast Corp.

350 Tons, West Tulsa, Okla., Public Service Co. power station, to Tulsa Boiler & Machinery Co.

345 Tons, Van Nuys, Calif., General Motors auto-parts warehouse, to Bethlehem Pacific Coast Corp.

282 Tons, St. Louis, assembly plant for Ford Motor Co., to Laclede Steel Co., through Patrick Aarren Construction Co., Chicago, general contractors.

260 Tons, Grand Coulee, Wash., face caisson for dam spillway, to Consolidated Steel Corp.

259 Tons, Redding, Calif., 9 fixed wheel gates Keswick Dam, to American Bridge Co., Denver.

200 Tons, Lynn, Mass., General Electric Co. unit, to Lehigh Structural Steel Co.

200 Tons, Providence, Narragansett Electric Co. turbo generator foundation, to American Bridge Co., Pittsburgh.

158 Tons, Stockton, Calif., Pacific Telephone & Telegraph Co. building, to Judson-Pacific-Murphy Corp.

100 Tons, Berkeley, Calif., University of California mess hall, to Moore Dry Dock Co.

• • • **Fabricated steel inquiries** this week were as follows:

2000 Tons, Mobile, Ala., Waterman Steamship Lines.

1700 Tons, Lancaster, S. C., Springs Cotton Mill.

1300 Tons, Kerns, Va., Lime plant, National Gypsum Co.

1100 Tons, Grand Coulee, Wash., 9 coaster gates, Grand Coulee dam.

1000 Tons, Staten Island, N. Y., Staten Island Edison Co.

870 Tons, Red Bluff, Calif., steel piling for 5 highway bridges, bids Jan. 16 at Sacramento.

816 Tons, San Mateo, Calif., Bay Shore Freeway overcrossing, bids Jan. 16 to Div. of Highways, Sacramento.

700 Tons, Canton, Okla., North Canadian river dam, bids about Feb. 7 to U. S. Engineers, Tulsa, Okla.

500 Tons, St. Louis, addition to warehouse for Famous-Barr Co., Westlake Construction Co., general contractors.

500 Tons, Chicago, modifications to Conway Building.

400 Tons, Kenosha, Wis., American Brass Co. plant extension.

330 Tons, Tracy, Calif., two highway bridges at Paradise Cut, bids Jan. 23 to Div. of Highways, Sacramento.

312 Tons, Bonneville, Ore., substation structures, Inv. 3504.

300 Tons, San Jose, Calif., Beechnut Packing Co. plant building.

297 Tons, Auburn, Calif., highway bridge and over-pass, H. W. Ruby, Sacramento, low on general contract.

250 Tons, Emeryville, Calif., U. S. Envelope Corp., warehouse.

250 Tons, Chicago, Illinois Institute of Technology, metallurgy building.

197 Tons, Oceanside, Calif., Santa Fe RR highway overcrossing, Fred D. Kyle, Pasadena, low bidder on general contract.

183 Tons, Colton, Calif., structures on Mulberry-Colton state highway, Griffith Co., Los Angeles, low bidder on general contract.

163 Tons, Glendale, Nev., state highway structures, Gibbon & Reed, Salt Lake City, general contractors.

100 Tons, Mare Island, Calif., Navy buildings for reserve fleet berthings, spec. 17459, NOY 13295.

• • • **Reinforcing bar awards** this week included the following:

3000 Tons, Cincinnati, Plaza Terrace Hotel and department store, Thomas Emery's Sons, owner, J. C. Penney Co., lessee, Cincinnati, to Pollak Steel Co., through Frank Messer & Son, contractor.

1250 Tons, Marysville, Calif., Feather River highway crossing, to Gunn-Carle Co.

875 Tons, Chicago, Cadillac Motor Car Div., sales and service building, to Ceco Steel Products Corp., Chicago.

800 Tons, Sacramento, Calif., State highway freeway at Ben Alli to Judson-Pacific-Murphy Corp.

700 Tons, Brooklyn, Clinton Hill housing project, Starrett Bros. & Eken, contractors, to Truscon Steel Co., Youngstown.

675 Tons, Detroit, Hudson's department store warehouse, to Concrete Steel Fireproofing Co., Detroit.

550 Tons, White Oaks, Md., ordnance laboratory for Navy, Shop Building No. 25, to Bethlehem Steel Co., Bethlehem, Pa., through Dyker Building Co., Washington.

452 Tons, St. Paul, Minn., Waldorf Paper Products Co., to Paper, Calmenson & Co., St. Paul.

450 Tons, St. Paul, Minn., Ziegler Co., to Paper, Calmenson & Co., St. Paul.

400 Tons, East Lansing, Mich., State College buildings, to Capitol Steel Corp.

325 Tons, Doraville, Ga., assembly plant for General Motors Corp., through W. C. Caye & Co., contractors, to Truscon Steel Co., Youngstown.

320 Tons, Bronx, N. Y., factory building, F. W. Farber Co., to Truscon Steel Co., Youngstown.

300 Tons, Chicago, White Cap Co. structure, to Ceco Steel Products Co., Chicago.

247 Tons, Racine, Wis., Western Print & Lithograph Co., to Worden-Allen Co., Milwaukee.

150 Tons, Portsmouth, Va., Coast Guard dock, to Hall-Hodges, Inc., Richmond, Va., through Tidewater Construction Co.

150 Tons, Davenport, Iowa, St. Vincent's hospital, to Concrete Steel Co.

124 Tons, mesh, for New Jersey Highway Letting, awarded to Truscon Steel Co., Youngstown, through F. A. Canuso.

• • • **Reinforcing bar inquiries** this week included the following:

2100 Tons, San Francisco, Calif., structures for San Francisco navy yard at Hunters Point.

1200 Tons, Mare Island, Calif., miscellaneous structures for reserve fleet berthings at navy yard, bids January 14.

1000 Tons, Hammond, Ind., Standard Oil Co. of Indiana research laboratory.

800 Tons, East Lansing, Mich., buildings, Michigan State College.

750 Tons, Minneapolis, Coca-Cola bottling plant.

700 Tons, Evanston, Ill., Northwestern University dormitory.

650 Tons, Glen Ellyn, Ill., Maryville College.

600 Tons, Albany, N. Y., Brewerwyck Breweries, Inc., brewery.

500 Tons, Canton, Okla., North Canadian river dam, bids about Feb. 7 to U. S. Engineers, Tulsa, Okla.

500 Tons, Lincoln, R. I., grandstand and clubhouse.

482 Tons, Red Bluff, Calif., five state highway bridges, bids Jan. 16 to Div. of Highways, Sacramento.

350 Tons, Milwaukee, Milwaukee Printing Co. plant.

350 Tons, Chicago, apartment building, 6900 So. Crandon Ave.

300 Tons, Peoria Heights, Ill., Pabst Brewing Co. plant.

300 Tons, San Jose, Calif., Beechnut Packing Co. plant.

300 Tons, Peoria, Ill., Illinois Bell Telephone Co. building.

290 Tons, Superior, Wis., bins for Great Northern Railroad.

250 Tons, Fort Dodge, Iowa, Tobin Packing Co. plant.

250 Tons, Cedar, Iowa, Quaker Oats Co. structure.

200 Tons, Washington, roller rink and bowling alley.

200 Tons, Cedar Rapids, Iowa, Link-Belt Speeder Co. building.

175 Tons, Chicago, subway approaches.

160 Tons, Wallingford, Conn., New Haven Railroad overcrossing.

156 Tons, Auburn, Calif., highway bridge and overcrossing, H. W. Ruby, Sacramento, general contractor.

150 Tons, Kansas City, Mo., 12th St. bridge.

150 Tons, Chicago, W. O. Kling & Associates.

150 Tons, Chicago, Estes Bedding Co. plant.

150 Tons, San Jose, Calif., J. C. Penney Co. building.

150 Tons, Milwaukee, Sears, Roebuck & Co. building.

140 Tons, San Mateo, Calif., Bay Shore Freeway overcrossing, bids Jan. 16 to Div. of Highways, Sacramento.

120 Tons, Dayton, Ohio, Terminal Cold Storage & Ice Co. plant.

115 Tons, Snowflake, Ariz., state highway structures, W. J. Henson, Prescott, Ariz., general contractor.

113 Tons, Glendale, Nev., state highway structures, Gibbons & Reed, Salt Lake, general contractors.

110 Tons, Chicago, addition to Tribune Tower.

100 Tons, Crawfordsville, Ind., R. R. Donnelly & Sons printing plant addition.

Steel Warehouse Merger

Chicago

• • • **Merger of Gibbs** Steel Co., Milwaukee, with A. M. Castle & Co., steel distributors, was announced recently.

The Milwaukee plant will operate as the Gibbs Steel Div. of A. M. Castle & Co. During the past year Gibbs has been operated as a wholly owned subsidiary of Castle. There will be no management changes, and George Gibbs will continue as chief executive in Milwaukee.

Other Castle branches are located in Los Angeles, San Francisco, Oakland and Seattle, with the principal office in Chicago.

MACHINE TOOLS

Government Surplus Clogging Sales

Cleveland

• • • **While informed** sources seemingly have little doubt that machine tool shipments have been held up by the automobile industry's labor difficulties in particular, and by the concomitant business climate created by union-management squabbles in general, the drop-off in November business and the decline that December figures are expected to show, suggest that along with the temporary tightening of a few belts, the industry is getting back to a buyers' market.

Many observers feel that the current mass of government-owned machine tools is the most potent torpedo fired into the industry's side since the hey-day of renegotiation, an official removal of the builders' armor plate. Aside from the factor of actual sales, which to some builders is welcome information, these observers point to the clouds of indecision the mere presence of surplus tools casts over the new sales horizon of practically the entire industry. According to some reports, many buyers are on the fence for no other reason, and the instability of this position is engendered by conflicting accounts of windfalls and disappointments and sales to lessees in possession who admittedly are in a spot to get their share of the cream of the surplus crop.

Some buyers of the surplus, of course, would not buy new tools anyway, but regardless, these tool interfere with orders even down to the time lost while customers are looking over the surplus. Actual sales reports are another matter, and while those being issued currently by the Reconstruction Finance Corp. leave a good deal to be desired from the industry's point of view, they are some sort of clue to the volume of disposing loan agency business. It has been reported locally that RFC is selling about 800 machines a month, or 10,000 a year, which includes all makes, types and sizes, from ants to elephants. At this rate, it would take six years to sell the surplus declaration of 60,000 machines turned over to RFC as of November 1945.

On the optimistic end of the grapevine, it was recently heard here that RFC has sold approximately one-third of all machine tools turned over to them. This would mean the good ones, tools that never get to the warehouses. Along this same line, it has been rumored that the government will take another approximate third for the standby plants, bringing the other third of the surplus tools, possibly 200,000 into sharp focus.

In any event, the surplus is definitely affecting new sales at the present time and this will continue in varying degree until the tools are absorbed or the builders design them into obsolescence. Some observers think this may be a long, drawn-out affair which in itself should be sufficient to convince the industry of its need for greater liaison with the surplus market in the form of fact-finding to determine location and the volume of all types, makes and sizes in RFC's aggregate reports.

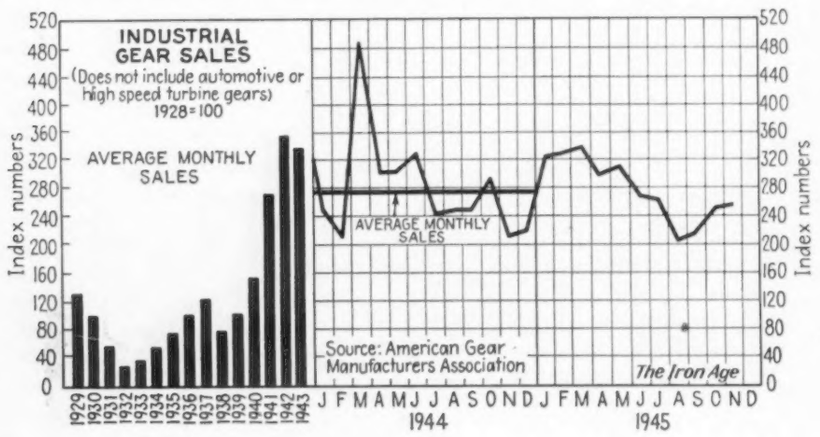
Meanwhile, RFC is struggling with the appointment of agents to sell the surplus and is still in a huddle going over licensing which will probably mean another week or so before the dealers can actually start. Many dealers are signing up simply because their regular customers who buy surplus tools will look to them for service whether the tools came through them or not.

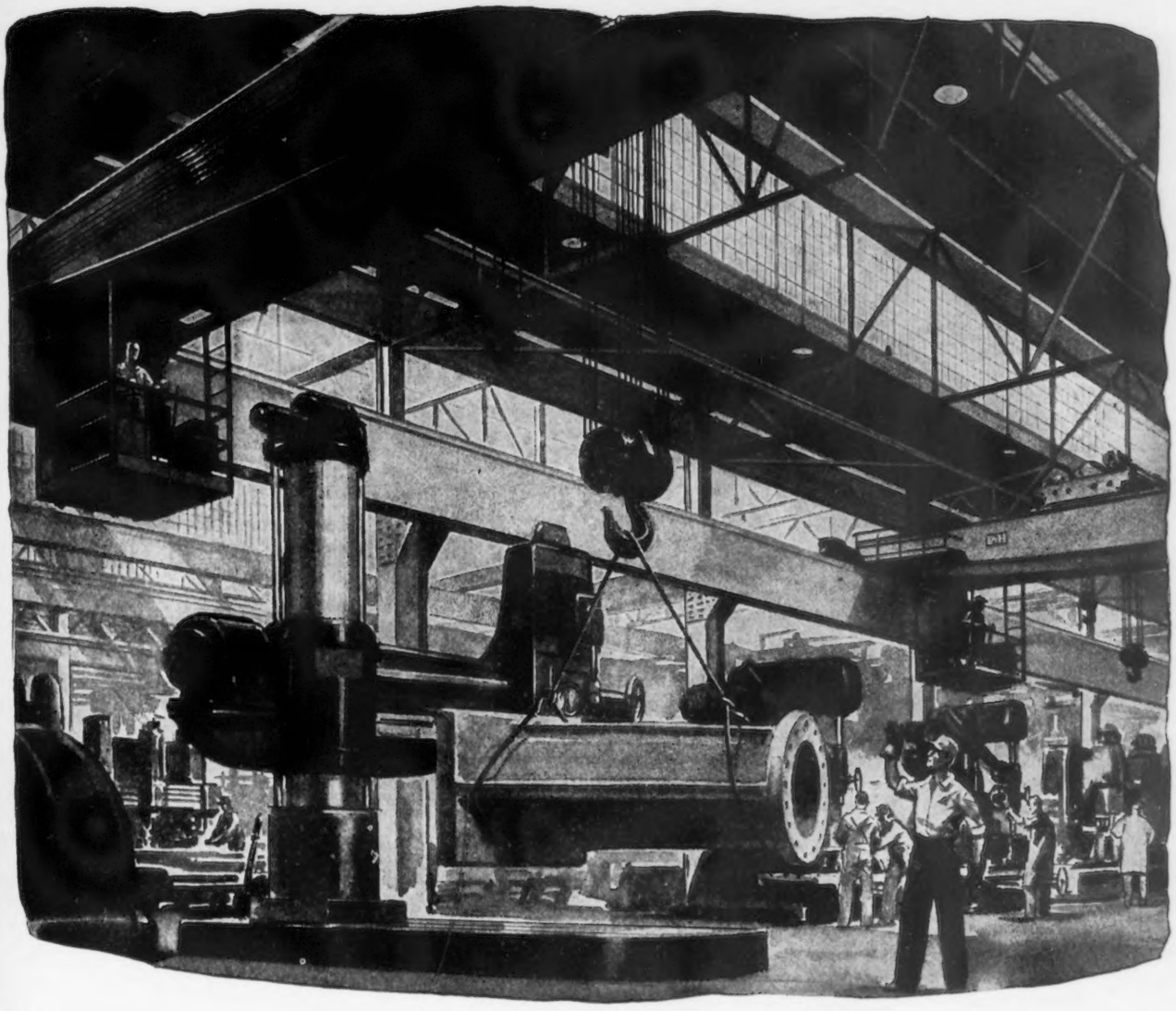
Used dealers will find more chances for profit where they buy independently and sell independently because they can buy at Clayton formula prices and sell at OPA prices if they so desire, which means they won't be limited to 12½ pct. Along with a more enticing markup, this will carry the advantage of quick delivery without red tape. Some dealers have been discouraged by the prospects of this and feel that eventually RFC should be able to get transactions through in good shape.

Sources in the trade report that foreign business, which is currently more a matter of talk than orders, is coming through and that the only thing saving the situation in 1946 is the fair assurance of a volume of foreign trade with money the government has loaned.

NOVEMBER GEAR SALES INCREASE

. . . The gearing industry, as represented by the members of the American Gear Manufacturers Assn., shows an increase in the volume of sales for November, as compared with October, of 1.6 pct. This report does not include turbine or propulsion gearing. The index figure for November was 255.





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NONFERROUS METALS

. . . News and Market Activities

Postwar Competition Seen in Nickel

New York

• • • **The Nicaro nickel** mines and refinery in Cuba, producing nickel oxide from ores analyzing 1.5 pct nickel content are to be placed on the market in surplus disposal of another DPC plant in the next several months, it has been revealed by a government source. While it is premature now to announce detailed plans for acquisition of the plant, Nicaro officials have confirmed the fact that the company, a subsidiary of Freeport Sulfur Co., will enter its bid for these facilities.

Selling nickel in bagged oxide form to the steel industry at a price of 27.5c. per lb of contained nickel and cobalt in carload lots f.o.b., Baltimore, and 29.5c. per lb in quantities of less than 5000 lb, the company is able to deliver its product at Baltimore with some profit, officials say. Built as a wartime facility at a cost of $33.5 million, wartime plant costs are not included in these figures. Prices to other industries are 30.5c. per lb in carloads, 31.5c. per lb, l.c.l.

Current monthly production is at the rate of 2.2 million lb of contained nickel in oxide form, about 18 pct of total estimated postwar requirements. It was recently reported that there is more Canadian nickel available than required since the lessened consumption rate for nickel at the close of the war. Since Nicaro nickel oxide is selling at present markets at some 2c. per lb below contract-basis Canadian nickel, there are some observers who anticipate the possibility of price competition between the two biggest factors in the industry.

The price of nickel has been maintained at 35c. per lb to non-contract customers since 1926. Prior to that time it averaged 40c. per lb, with minor fluctuations, ever since 1903.

o o o

Canada's Markets Active

Toronto

• • • **Prospects for improved** markets for Canadian base metals have brightened considerably in the past few weeks and at the present time it appears that producers in this country will have no problem in disposing of their entire output for 1946. In addition to domestic demand, prospects are favorable for large order-placing from Great Britain and other European countries, and it is expected that the United States will continue to buy heavily in this market. Insofar as European and British buying is concerned, however, there is still the question of financing, but it is expected that this difficulty soon will be overcome.

Since the beginning of this year both International Nickel Co. of Canada and Falconbridge Nickel Mines have reduced production by 25 pct, which brings the present rate to 55 pct of the total war production peak. International Nickel now is handling 18,000 tons of ore daily against a war peak level of 40,000 tons per day. It is reported that the present rate of production will be sufficient to take care of all demand for nickel under peacetime conditions.

•

SAE Views Tin Position

Detroit

• • • **A continuing shortage** of tin threatens production in the United States, which consumes 40 pct of the world supply and produces none, it was reported to this week's convention of the Society of Automotive Engineers by C. E. Huessner and E. T. Johnson of Chrysler Corp., Detroit.

Reduction of tin consumption, in many instances by methods developed by the SAE War Engineering Board, was looked upon as a means of extending the supply, for which no really adequate substitute exists.

In the interest of conservation, consumption per motor vehicle was said to have been reduced to two lb or less, from four lb in 1940. Other means for additional savings include redesign of parts to eliminate tin, improvement of processing to minimize demand, and development of domestically-produced alternate materials. Obstacles were classified as metallurgical, involving difficulties in finding suitable alternates; economic, resulting from increased costs; and psychological, representing the natural human resistance to change.

Tin savings are being promoted, it was said, by substituting electroplating for dipping in tin can manufacture, and by larger use of secondary tin, recovered from tin can salvage operations, in solder, babbitt and bronze. Conservation was said also to be helped by decreasing the tin content of solder, one of the greater uses. This content was estimated to have declined to 29 pct of tin in 1943 and 38 pct of tin in 1939.

Current total tin stocks in the United States were estimated at 95,000 tons, slightly better than a 1-yr supply at present restricted rates of consumption.

•

Cadmium to Be Controlled

Washington

• • • **An increasingly tight** supply-demand situation may require CPA to renew controls over cadmium. This is one of the matters to be discussed at the forthcoming cadmium industry advisory committee meeting.

Order M-65 which restricted delivery and use of cadmium was revoked by WPB, CPA's predecessor, on Aug. 20.

Under present inventory restrictions, users are permitted 45 days or minimum practicable working inventories of cadmium balls, sticks, slabs and anodes.

The government stockpile maintained by RFC totaled 1,225,971 lb as of Oct. 31.

Primary Metals

(Cents per lb, unless otherwise noted)

Aluminum, 99+%, del'd (Min. 10,000 lb)	15.00
Aluminum pig	14.00
Antimony, American, Laredo, Tex.	14.50
Beryllium copper, 3.75-4.25% Be; dollars per lb. contained Be	$17.00
Cadmium, del'd	90.00
Cobalt, 97-99% (per lb)	$1.50 to $1.57
Copper, electro, Conn. valley	12.00
Copper, electro, New York	11.75
Copper, lake	12.00
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.8%, dollars per troy oz.	$ 2.25
Iridium, dollars per troy oz.	$90-$100
Lead, St. Louis	6.35
Lead, New York	6.50
Magnesium, 99.9 + %, carlots	20.50
Magnesium, 12-in. sticks, carlots	27.50
Mercury, dollars per 76-lb flask, f.o.b. New York	$109 to $112
Nickel, electro	35.00
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per oz.	$35.00
Silver, New York, cents per oz.	71.11
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.65

Remelted Metals

(Cents per lb)

Aluminum, No. 12 Fdy. (No. 2)	9.00 to 10.00
Aluminum, deoxidizing No. 2, 3, 4	7.25 to 10.00
Brass Ingot	
85-5-5-5 (No. 115)	13.25
88-10-2 (No. 215)	16.75
80-10-10 (No. 305)	16.00
No. 1 Yellow (No. 405)	10.25

Copper, Copper Base Alloys

(Mill base, cents per lb)

	Extruded Shapes	Rods	Sheets
Copper	20.87	....	20.37
Copper, H.R.	....	17.37	....
Copper drawn	....	18.37	....
Low brass, 80%	....	20.40	20.15
High brass	....	....	19.48
Red brass, 85%	....	20.61	20.36
Naval brass	20.37	19.12	24.50
Brass, free cut	....	15.01	....
Commercial bronze, 90%	....	21.32	21.07
Commercial bronze, 95%	....	21.53	21.28
Manganese bronze	24.00	....	28.00
Phos. bronze, A, B, 5%	....	36.50	36.25
Muntz metal	20.12	18.87	22.75
Everdur, Herculoy, Olympic or equal	....	25.50	26.00
Nickel silver, 5%	....	28.75	26.50
Architect bronze	19.12	....	....

Aluminum

(Cents per lb., subject to extras on gage, size, temper, finish, factor number, etc.)

Tubing: 2 in. O.D. x 0.065 in. wall 2S, 40c. (½H); 52S, 61c. (O); 24S, 67½c.

Plate: 0.250 in. and heavier; 2S and 3S, 21.2c.; 52S, 24.2c.; 61S, 22.8c.; 24S, 24.2c.

Flat Sheet: 0.188 in. thickness; 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base for tubing; 30,000-lb. base for plate, flat stock.

Extruded Shapes: "As extruded" temper; 2000-lb. base, 2S and 3S, factor No. 1 to 4, 25.5c.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 53S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28½c.

The factor is determined by dividing perimeter of shape by weight per lineal foot.

Wire Rod and Bar: Base price; 17ST and 11ST-3, screw machine stock. Rounds: ¼ in., 28½c. per lb.; ½ in., 26c.; 1 in., 24½c.; 2 in., 23c. Hexagonals; ¼ in., 34½c. per lb.; ½ in., 28½c.; 1 in., 25½c.; 2 in., 25½c. 2S, as fabricated, random or standard lengths, ¼ in., 44c. per lb.; ½ in., 25c.; 1 in., 24c.; 2 in., 23c. 24ST, rectangles and squares, random or standard lengths, 0.093-0.187 in. thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27½c.

Magnesium

Sheet, rod, tubes, bars, extruded shapes subject to individual quotations. Metal turnings: 100 lb. or more, 46c. a lb.; 25 to 90 lb., 56c.; less than 25 lb., 66c.

NONFERROUS SCRAP METAL QUOTATIONS

†(OPA basic maximum prices, cents per lb., f.o.b. point of shipment, subject to quality, quantity and special preparation premiums—other prices are current quotations)

Copper, Copper Base Alloys

OPA Group 1†

No. 1 wire, No. 1 heavy copper	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper	9.75
No. 2 wire, mixed heavy copper	8.75
Copper tuyeres	8.75
Light copper	7.75
Copper borings	9.75
No. 2 copper borings	8.75
Lead covered copper wire, cable	6.00*
Lead covered telephone, power cable	6.04
Insulated copper	5.10*

OPA Group 2†

Bell metal	15.50
High grade bronze gears	13.25
High grade bronze solids	11.50*
Low lead bronze borings	11.50*
Babbitt lined brass bushings	13.00
High lead bronze solids	10.00*
High lead bronze borings	10.00*
Red trolley wheels	10.75
Tinny (phosphor bronze) borings	10.50
Tinny (phosphor bronze) solids	10.50
Copper-nickel solids and borings	9.25
Bronze paper mill wire cloth	9.50
Aluminum bronze solids	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)	9.00
Gilding metal turnings	8.50
Contaminated gilded metal solids	8.00
Unlined standard red car boxes	8.25
Lined standard red car boxes	7.75
Cocks and faucets	7.75
Mixed brass screens	7.75
Red brass breakage	7.50
Old nickel silver solids, borings	6.25
Copper lead solids, borings	6.25
Yellow brass castings	6.00
Automobile radiators	7.25
Zincy bronze borings	7.00
Zincy bronze solids	8.00

OPA Group 3†

Fired rifle shells	8.00
Brass pipe	7.25
Old rolled brass	6.75
Admiralty condenser tubes	7.25
Muntz metal condenser tubes	6.75
Plated brass sheet, pipe reflectors	6.25
Manganese bronze solids	7.00[1]
Manganese bronze solids	6.00[2]
Manganese bronze borings	6.25[1]

OPA Group 4†

Refinery brass	4.50*

*Price varies with analysis, [1] Lead content 0.00 to 0.40 per cent. [2] Lead content 0.41 to 1.00 per cent.

Other Copper Alloys

Briquetted Cartridge Brass Turnings	8.625
Cartridge Brass Turnings, Loose	7.875
Loose Yellow Brass Trimmings	7.875

Aluminum*

Plant scrap, segregated

2S solids	8.00
Dural alloys, solids 14, 17, 18, 24S	4.00
25S turnings, dry basis	3.00
Low copper alloys 51, 52, 61, 63S solids	7.25
turnings, dry basis	5.75

Plant scrap, mixed

Solids	4.00
Turnings, dry basis	2.75

Obsolete scrap

Pure cable	8.00
Old sheet and utensils	6.00
Old castings and forgings	5.00
Pistons, free of struts	5.00
Pistons, with struts	3.00
Old alloy sheet	5.00

Magnesium*

Segregated plant scrap

Pure solids and all other solids, exempt	
Borings and turnings	1.50

Mixed, contaminated plant scrap

Grade 1 solids	3.00
Grade 1 borings and turnings	2.00
Grade 2 solids	2.00
Grade 2 borings and turnings	1.00

*Nominal.

Zinc

New zinc clippings, trimmings	6.50
Engravers, lithographers plates	6.50
Old zinc scrap	4.75
Unsweated zinc dross	5.00
Die cast slab	4.50
New die cast scrap	4.45
Radiator grilles, old and new	3.50
Old die cast scrap	3.00

Lead

Deduct 0.55c. a lb. from refined metal basing point prices or soft and hard lead including cable, for f.o.b. point of shipment price.

Nickel

Ni content 98+%, Cu under ½%, 23¢ per lb.; 90 to 98% Ni, 23¢ per lb. contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb., f.o.b. shipping point in 500 lb. lots)

Copper, frt. allowed	
Cast, oval, 15 in. or longer	25½
Electrodeposited	18⅞
Rolled, oval, straight	19½
Curved	20⅝
Brass, 80-20, frt. allowed	
Cast, oval, 15 in. or longer	23⅝
Zinc, cast, 99.99, 15 in. or longer	16¼
Nickel, 99 per cent plus, frt. allowed	
Cast	47
Rolled, depolarized	48
Silver, 999 fine	
Rolled, 100 oz. lots, per oz.	80

Chemicals

(Cents per lb., f.o.b. shipping point)

Copper cyanide, 1-5 bbls.	34.00
Copper sulphate, 99.5, crystals, bbls.	7.75
Nickel salts, single, 425 lb. bbls., frt. allowed	13.50
Silver Cyanide, 100 oz. lots, per oz.	0.6083
Sodium cyanide, 96 per cent, domestic, 100 lb. drums	15.00
Zinc cyanide, 100 lb. drums	33.00
Zinc sulphate, 89 per cent, crystals, bbls., frt. allowed	6.35

SCRAP

Holidays Over — Strike Threat Looms

New York

• • • **With the holiday** season a past-tense item, the scrap industry has again returned to what might be called normal—that is, a tight market, with demand by far exceeding supply. Prices are holding firm, and no changes have been reported, except for three price boosts to ceiling in Chicago.

Although all factors are expressing concern over the impending strike situation, which is now just around the corner, consumers in all sectors of the country are in the market as if no such threat existed. As a matter of fact principal mills in Pittsburgh and Chicago are reported making arrangements to insure scrap movement during the strike.

Toronto reports that some Canadian steelmaking firms are purchasing naval vessels from the War Assets Corp. for scrapping, in view of the dearth of supplies on hand and the lack of material moving from the United States.

•

PITTSBURGH—The scrap situation in this area is still quite serious, with shipments being very low. Consumers are stretching farther and farther to get scrap, paying mainly in the neighborhood of $2.00 in freight. With the strike coming on, it is the intention of the largest interest here to maintain scrap shipments insofar as is possible. Some arrangement to continue scrap movement during the strike is in the process of formulation, and will probably be settled before the week is over. While shipments are low, there are no holdups along the line. Everything is moving that is available, even though deliveries by the railroads are slowed up to some extent.

•

CHICAGO—Local mills are considering the possibility of placing additional orders for West Coast scrap despite the high freight rate. Shipments of Texas scrap are increasing on volume. Arrangements are being made for halting shipments in the event that action is not taken to postpone or call off the steel strike.

•

BUFFALO—The heat was on for all types of scrap during the past week as the January thaw opened up supply lines, but failed to unleash any great volume of shipments. Some small consumers already have passed along the word that rail consignments must be in hand before the steel strike deadline to avoid possible demurrage charges. The time allowance between scrap yards and mills in the Buffalo switching district ranges from one to three days, depending on their relative locations. The Government's offering of 2648 tons of surplus steel for scrap at the local American Car and Foundry plant was awarded to Summer and Co., Buffalo, on a bid of $21.39 a gross ton (ceiling for low phos).

New Officers Elected

• • • Edward L. Solomon, president and treasurer of Max Solomon Co., Pittsburgh, announced the election of H. Alfred Solomon as vice-president and assistant treasurer of the company, and Ray H. Meister as secretary.

•

PHILADELPHIA — Scrap prices here are being firmly maintained although in anticipation of the steel strike date on Jan. 14, mills are holding up orders already placed and are not releasing new contracts. Mill scrap supply is reported to be exceedingly tight here and shipments are being held up merely because of the fear that labor will not be on hand to unload and warehouse the scrap. Some mills have gone so far as to request dealers to attempt to prepare and stockpile scrap for delivery to them when the strike is concluded.

•

DETROIT—Demand continues strong here, and supply remains very thin, and will so continue while the General Motors strike lasts. Termination scrap is providing the only movement of note, and there is not much of that.

•

BOSTON — Yards report labor supply improved and no steel mill holdups on orders in hand despite the strike threat. Lack of material is still a market factor, however. Foundries are short of help and casting shipments to metalworking shops uncertain, thus cutting down borings and turnings supplies. Heavy material, including cast, is especially short. Freight cars and trucks are more easily obtained.

•

NEW YORK—Scrap movement in this area has returned to the condition that prevailed prior to the Christmas-New Year's holiday letdown. The market remains firm with supply trailing far behind demand. Prices are holding firm at the ceiling, with no changes being reported during the past week. The impending strikes scheduled for next week have not as yet made themselves severely felt, in that the major consumers are buying as if no such threat existed. Some of the smaller mills are specifying, however, that deliveries be made by Friday or Saturday preceding the fateful Monday, Jan. 14.

•

CLEVELAND—Possibly presaging the steel industry's nearing labor crisis, all grades are in extremely tight supply and are bringing ceiling prices. Some consumers are reported paying higher springboards, $1.50 plus for low phos in this area, and in the words of one buyer, scrap is bad, bad to get and bad when you get it. An estimated minimum of 50,000 tons of termination inventory scrap has come out in the northern Ohio area and while some observers class this estimate as low, it is certainly nothing more than a drop in the bucket.

•

CINCINNATI — Despite the general feeling in the iron and steel scrap market locally that further strikes in consuming industries will materialize, the market continues firm and tight. Dealers and brokers indicate that there is a small improvement in the industrial scrap, but not sufficient to meet demands, and that other types continue to move into the area at less than the desired rate. Prices are still pressing ceiling, with consumers now willing to pay long freight rates so that they can be assured of obtaining material. Most melters in the area have reasonably adequate inventories, but are still taking whatever material is offered.

•

BIRMINGHAM—Unless the outlook for a settlement in the threatened steel strike becomes more encouraging, deliveries of openhearth and blast furnace material to mills in this area probably will cease this week. The strike-caused halt in deliveries would follow very heavy demand for all grades of scrap.

•

TORONTO — The completion of the year-end holiday season failed to bring any improvement to the Canadian scrap markets. Local dealers report fresh receipts at a mere trickle and state that there is not enough scrap appearing on the market to provide 25 pct of current consumer requirements. Some steelmakers have been adding to their scrap supply by purchase of corvettes and other naval craft from War Assets Corp., and it is stated that ten of these craft have been acquired by Hamilton firms for scrapping. The usual sources of scrap supply have little to offer at this time and shipments from the United States also are well below average. Both steel and iron scrap materials are in short supply, resulting in increased use of pig iron in melting operations.

Going prices as obtained in the trade by IRON AGE editors, based on representative tonnages. Where asterisks are used on quotations below, this indicates a ceiling price to which must be added brokerage fee and adjusted freight.

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting	$20.00*
RR. hvy. melting	21.00*
No. 2 hvy. melting	20.00*
RR. scrap rails	21.50*
Rails 3 ft. and under	23.50*
No. 1 comp'd sheets	20.00*
Hand bdld. new shts.	20.00*
Hvy. axle turn.	19.50*
Hvy. steel forge turn.	19.50*
Mach. shop turn.	15.00*
Short shov. turn.	17.00*
Mixed bor. and turn.	15.00*
Cast iron borings	16.00*
Hvy. break cast.	16.50*
No. 1 cupola	20.00*
RR. knuck. and coup.	24.50*
RR. coil springs	24.50*
Rail leaf springs	24.50*
Rolled steel wheels	24.50*
Low phos. bil. crops	25.00*
Low phos.	22.50*
RR. malleable	22.00*

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$18.75*
No. 2 hvy. melting	18.75*
No. 1 bundles	18.75*
No. 2 dealers' bndls.	18.75*
Bundled mach. shop turn.	18.75*
Galv. bundles	16.75*
Mach. shop turn.	13.75*
Short shovels, turn.	15.75*
Cast iron borings	14.75*
Mix. borings & turn.	13.75*
Low phos. hvy. forge	23.75*
Low phos. plates	21.25*
No. 1 RR. hvy. melt.	19.75*
Reroll rails	22.25*
Miscellaneous rails	20.25*
Rails 3 ft. and under	22.25*
Locomotive tires, cut	24.25*
Cut bolsters & side frames	22.25*
Angles & splice bars	22.25*
Standard stl. car axles	25.75*
No. 3 steel wheels	23.25*
Couplers & knuckles	23.25*
Agricul. malleable	22.00*
RR. malleable	22.00*
No. 1 mach. cast.	20.00*
No. 1 agricul. cast.	20.00*
Hvy. breakable cast.	16.50*
RR. grate bars	15.25*
Cast iron brake shoes	15.25*
Stove plate	19.00*
Clean auto cast.	20.00*
Cast iron carwheels	20.00*

CINCINNATI

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.50*
No. 2 hvy. melting	19.50*
No. 1 bundles	19.50*
No. 2 bundles	19.50*
Mach. shop turn.	$10.50 to 11.00
Shoveling turn.	12.50 to 13.00
Cast iron borings	11.50 to 12.00
Mixed bor. & turn.	11.50 to 12.00
Low phos. plate	22.00*
No. 1 cupola cast.	20.00*
Hvy. breakable cast.	16.50*
Stove plate	19.00*
Scrap rails	21.00*

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars

No. 1 hvy. melting	$15.05*
No. 2 hvy. melting	15.05*
No. 1 and 2 bundles	15.05*
Busheling	15.05*
Turnings, shovelings	12.05*
Machine shop turn.	10.05*
Mixed bor. & turn.	10.05*
Cl'n cast, chem. bor.	$13.06 to 14.15*

Truck delivery to foundry

Machinery cast.	21.00 to 23.51*
Breakable cast	21.57 to 21.87*
Stove plate	20.00 to 23.51*

DETROIT

Per gross ton, brokers' buying prices:

No. 1 hvy. melting	$17.32*
No. 2 hvy. melting	17.32*
No. 1 bundles	17.32*
New busheling	17.32*
Flashings	17.32*
Mach. shop turn.	12.32*
Short shov. turn.	14.32*
Cast iron borings	13.32*
Mixed bor. & turn.	12.32*
Low phos. plate	19.82*
No. 1 cupola cast.	20.00*
Charging box cast.	19.00*
Hvy. breakable cast.	16.50*
Stove plate	19.00*
Automotive cast	20.00*

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	$18.75*
No. 2 hvy. melting	18.75*
No. 2 bundles	18.75*
Mach. shop turn.	13.75*
Shoveling turn.	15.75*
Cast iron borings	$13.50 to 14.00
Mixed bor. & turn.	13.75*
No. 1 cupola cast	20.00*
Hvy. breakable cast	16.50*
Cast, charging box	19.00*
Hvy. axle forge turn.	18.25*
Low phos. plate	21.25*
Low phos. punchings	21.25*
Billet crops	21.25*
RR. steel wheels	23.25*
RR. coil springs	23.25*
RR. malleable	22.00*

ST. LOUIS

Per gross ton delivered to consumer:

Heavy melting	$17.50*
Bundled sheets	17.50*
Mach. shop turn.	12.50*
Locomotive tires, uncut.	$18.50 to 19.00
Misc. std. sec. rails	19.00*
Rerolling rails	21.00*
Steel angle bars	21.00*
Rails 3 ft. and under	21.50*
RR. springs	22.00*
Steel car axles	24.50*
Stove plate	19.00*
Grate bars	15.25*
Brake shoes	15.25*
RR. malleable	22.00*
Cast iron carwheels	20.00*
No. 1 mach'ery cast	20.00*
Breakable cast	16.50*

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	$17.00*
No. 2 hvy. melting	17.00*
No. 2 bundles	17.00*
No. 1 busheling	17.00*
Long turnings	12.00*
Shoveling turnings	14.00*
Cast iron borings	13.00*
Bar crops and plate	$18.50 to 19.50*
Structural and plate	18.50 to 19.50*
No. 1 cast	20.00*
Stove plate	19.00*
Steel axles	18.50*
Scrap rails	18.50
Rerolling rails	20.50*
Angles & splice bars	20.50 to 21.00
Rails 3 ft. & under	21.00*
Cast iron carwheels	17.50 to 18.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$20.00*
No. 2 hvy. melting	20.00*
Low phos. plate	22.50*
No. 1 busheling	20.00*
Hydraulic bundles	20.00*
Mach. shop turn.	15.00*
Short shovel. turn.	17.00*
Cast iron borings	16.00*

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$15.33*
No. 2 hvy. melting	15.33*
Comp. black bundles	15.33*
Comp. galv. bundles	13.33*
Mach. shop turn.	10.33*
Mixed bor. & turn.	10.33*
Shoveling turn.	12.33*
No. 1 cupola cast	20.00*
Hvy. breakable cast	16.50*
Charging box cast	19.00*
Store plate	19.00*
Clean auto cast	20.00*
Unstrip. motor blks.	17.50*
Cl'n chem. cast bor.	14.33*

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.25*
No. 1 bundles	19.25*
No. 2 bundles	19.25*
No. 2 hvy. melting	19.25*
Mach. shop turn.	14.25*
Shoveling turn.	16.25*
Cast iron borings	14.25*
Cast iron borings	15.25*
Mixed bor. & turn.	14.25*
Stove plate	19.00*
Low phos. plate	21.75*
Scrap rails	20.75*
Rails 3 ft. & under	22.75*
RR. steel wheels	23.75*
Cast iron car wheels	20.00*
RR. coil & leaf spgs.	23.75*
RR. knuckles & coup.	23.75*
RR. malleable	22.00*
No. 1 busheling	19.25*

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.50*
No. 2 hvy. melting	19.50*
Compressed sheet stl.	19.50*
Drop forge flashings	19.00
No. 2 bundles	19.50*
Mach. shop turn.	14.50*
Short shovel.	16.50*
No. 1 busheling	19.50*
Steel axle turn.	19.00*
Low phos. billet and bloom crops	24.50*
Cast iron borings	15.50*
Mixed bor. & turn.	14.50*
No. 2 busheling	17.00*
No. 1 machine cast	20.00*
Railroad cast	20.00*
Railroad grate bars	15.25*
Stove plate	19.00*
RR. hvy. melting	20.50*
Rails 3 ft. & under	23.00*
Rails 18 in. & under	24.25*
Rails for rerolling	23.00*
Railroad malleable	22.00*
Elec. furnace punch	22.00*

SAN FRANCISCO

Per gross ton delivered to consumer:

RR. hvy. melting	$15.00 to 15.75
No. 1 hvy. melting	15.00 to 15.75
No. 2 hvy. melting	14.00 to 14.75
No. 2 bales	12.50 to 13.25
No. 3 bales	8.50 to 9.25
Mach. shop turn.	7.00
Elec. furn. 1 ft. und.	15.50 to 17.00
No. 1 cupola cast.	19.00 to 21.00

LOS ANGELES

Per gross ton delivered to consumer:

No. 1 hvy. melting	$12.00 to $13.00
No. 2 hvy. melting	11.00 to 12.00
No. 2 bales	10.00 to 11.00
No. 3 bales	9.00 to 10.00
Mach. shop turn.	4.50
No. 1 cupola cast.	19.00 to 21.00

SEATTLE

Per gross ton delivered to consumer:

RR. hvy. melting	$10.00
No. 1 & No. 2 hvy. melting	10.00
Elec. furn. 1 ft. und.	$14.00 to 15.00
No. 1 cupola cast.	20.00*

HAMILTON, ONT.

Per gross ton delivered to consumer:

Heavy melting	$17.50*
No. 1 bundles	17.50*
No. 2 bundles	17.00*
Mixed steel scrap	15.50*
Rails, remelting	18.50*
Rails, rerolling	21.50*
Bushelings	13.00*
Mixed borings & turnings	12.50*
Electric furnace bundles	20.50*
Manganese steel scrap	20.00*
No. 1 cast	19.00*
Stove plate	17.50*
Car wheels, cast	19.50*
Malleable iron	16.00*

Comparison of Prices . .

Advances over past week in **Heavy Type**; declines in *Italics*. Prices are f.o.b. major basing points. The various basing points for finished and semifinished steel are listed in the detailed price tables.

Flat-Rolled Steel: (cents per pound)	Jan 8, 1946	Jan. 1, 1946	Dec. 4, 1945	Jan. 9, 1945
Hot-rolled sheets	2.20	2.20	2.20	2.10
Cold-rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.70	3.70	3.70	3.50
Hot-rolled strip	2.10	2.10	2.10	2.10
Cold-rolled strip	2.80	2.80	2.80	2.80
Plates	2.25	2.25	2.25	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c-r strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terneplate: (dollars per base box)				
Tinplate, standard cokes	$5.00	$5.00	$5.00	$5.00
Tinplate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (cents per pound)				
Merchant bars	2.25	2.25	2.25	2.15
Cold-finished bars	2.75	2.75	2.75	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40
Wire and Wire Products: (cents per pound)				
Bright wire	2.75	2.75	2.75	2.60
Wire nails	2.90	2.90	2.90	2.55
Rails: (dollars per gross ton)				
Heavy rails	$43.00	$43.00	$43.00	$40.00
Light rails	45.00	45.00	45.00	40.00
Semifinished Steel: (dollars per gross ton)				
Rerolling billets	$36.00	$36.00	$36.00	$34.00
Sheet bars	36.00	36.00	36.00	34.00
Slabs, rerolling	36.00	36.00	36.00	34.00
Forging billets	42.00	42.00	42.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp: (cents per pound)				
Wire rods	2.15	2.15	2.15	2.00
Skelp	1.90	1.90	1.90	1.90

Pig Iron: (per gross ton)	Jan 8, 1946	Jan. 1, 1946	Dec. 4, 1945	Jan. 9, 1945
No. 2 foundry, Phila.	$27.59	$27.59	$27.59	$25.84
No. 2, Valley furnace	25.75	25.75	25.75	24.00
No. 2, Southern, Cin'ti	26.19	26.19	26.19	24.44
No. 2, Birmingham	22.13	22.13	22.13	20.38
No. 2 foundry, Chicago†	25.75	25.75	25.75	24.00
Basic, del'd eastern Pa.	27.09	27.09	27.09	25.34
Basic, Valley furnace	25.25	25.25	25.25	23.50
Malleable, Chicago†	25.75	25.75	25.75	24.00
Malleable, Valley	25.75	25.75	25.75	24.00
L. S. charcoal, Chicago	42.34	42.34	42.34	37.34
Ferromanganese‡	135.00	135.00	135.00	135.00

† The switching charge for delivery to foundries in the Chicago district is 60¢ per ton.
‡ For carlots at seaboard.

Scrap: (per gross ton)				
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.32	17.32	17.32	17.32
Low phos. plate, Youngs'n	22.50	22.50	22.50	22.50
No. 1 cast, Pittsburgh	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	20.00
No. 1 cast, Chicago	20.00	20.00	20.00	20.00
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$7.50	$7.50	$7.50	$7.00
Foundry coke, prompt	9.00	9.00	9.00	8.25
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake	12.00	12.00	12.00	12.00
Tin, Straits, New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, virgin, del'd	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	14.50	14.50	14.50	14.50

Composite Prices . .

Starting with the issue of Apr. 22, 1943, the weighted finished steel index was revised for the years 1941, 1942 and 1943. See explanation of the change on p. 90 of the Apr. 22, 1943 issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 98 of that issue. The finished steel composite prices for the current quarter are an estimate based on finished steel shipments for the previous quarter. These figures will be revised when the actual data of shipments for this quarter are compiled.

	FINISHED STEEL	PIG IRON	SCRAP STEEL
Jan. 8, 1946	2.44076¢ per lb.	$25.37 per gross ton	$19.17 per gross ton
One week ago	2.44076¢ per lb.	$25.37 per gross ton	$19.17 per gross ton
One month ago	2.44076¢ per lb.	$25.37 per gross ton	$19.17 per gross ton
One year ago	2.27235¢ per lb.	$23.61 per gross ton	$19.17 per gross ton

	FINISHED STEEL HIGH	FINISHED STEEL LOW	PIG IRON HIGH	PIG IRON LOW	SCRAP STEEL HIGH	SCRAP STEEL LOW
1945	2.44076¢ Oct. 2	2.38444¢ Jan. 2	$25.37 Oct. 23	$23.61 Jan. 2	$19.17	$19.17
1944	2.30837¢ Sept. 5	2.21189¢ Oct. 5	$23.61	$23.61	19.17	$15.67 Oct. 24
1943	2.25513¢	2.25513¢	23.61	23.61	19.17	$19.17
1942	2.26190¢	2.26190¢	23.61	23.61	19.17	19.17
1941	2.43078¢	2.43078¢	$23.61 Mar. 20	$23.45 Jan. 2	$22.00 Jan. 7	$19.17 Apr. 10
1940	2.30467¢ Jan. 2	2.24107¢ Apr. 16	23.45 Dec. 23	22.61 Jan. 2	21.83 Dec. 30	16.04 Apr. 9
1939	2.35367¢ Jan. 3	2.26689¢ May 16	22.61 Sept. 19	20.61 Sept. 12	22.50 Oct. 3	14.08 May 16
1938	2.58414¢ Jan. 4	2.27207¢ Oct. 18	23.25 June 21	19.61 July 6	15.00 Nov. 22	11.00 June 7
1937	2.58414¢ Mar. 9	2.32263¢ Jan. 4	23.25 Mar. 9	20.25 Feb. 16	21.92 Mar. 30	12.67 June 8
1936	2.32263¢ Dec. 28	2.05200¢ Mar. 10	19.74 Nov. 24	18.73 Aug. 11	17.75 Dec. 21	12.67 June 9
1935	2.07642¢ Oct. 1	2.06492¢ Jan. 8	18.84 Nov. 5	17.83 May 14	13.42 Dec. 10	10.33 Apr. 29
1934	2.15367¢ Apr. 24	1.95757¢ Jan. 2	17.90 May 1	16.90 Jan. 27	13.00 Mar. 13	9.50 Sept. 25
1933	1.95578¢ Oct. 3	1.75836¢ May 2	16.90 Dec. 5	13.56 Jan. 3	12.25 Aug. 8	6.75 Jan. 3
1932	1.89196¢ July 5	1.83901¢ Mar. 1	14.81 Jan. 5	13.56 Dec. 6	8.50 Jan. 12	6.43 July 5
1931	1.99626¢ Jan. 13	1.86586¢ Dec. 29	15.90 Jan. 6	14.79 Dec. 15	11.33 Jan. 6	8.50 Dec. 29
1930	2.25488¢ Jan. 7	1.97319¢ Dec. 9	18.21 Jan. 7	15.90 Dec. 16	15.00 Feb. 18	11.25 Dec. 9
1929	2.31773¢ May 28	2.26498¢ Oct. 29	18.71 May 14	18.21 Dec. 17	17.58 Jan. 29	14.08 Dec. 3

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 pct of the United States output. Index recapitulated in Aug. 28, 1941 issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

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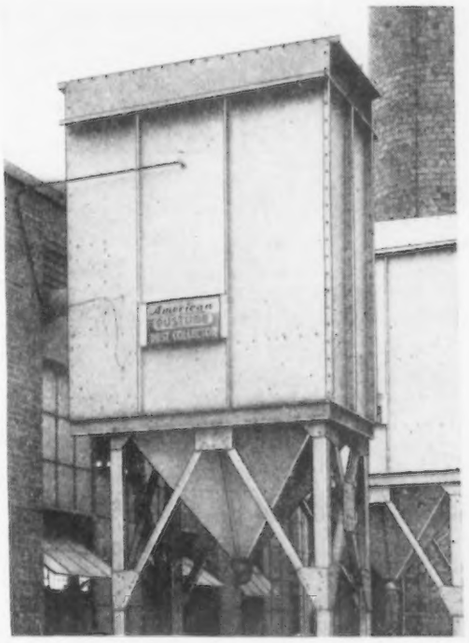

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Iron and Steel Prices . . .

Steel prices shown here are f.o.b. basing points, in cents per pound or dollars per gross ton. Extras apply. Delivered prices do not reflect 3 pct tax on freight. (1) Mill run sheet, 10¢ per 100 lb under base; primes, 25¢ above base. (2) Unassorted commercial coating. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25¢ per 100 lb to fabricators. (8) Also shafting. For quantities of 20,000 lb. to 39,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is not used. (11) Boxed. (12) This base price for annealed, bright finish wires, commercial spring wire. (13) Produced to dimensional tolerances in AISI Manual Sect. 6. (14) Billets only. (15) 9/32 in. to 47/64 in., 0.15c. per lb higher.

Basing Points	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	10 Pacific Ports, Cars	DELIVERED TO Detroit	New York	Philadelphia
INGOTS															
Carbon, rerolling	($31.00 f.o.b. mill)														
Carbon, forging	$36	$36	$36	$36	$36	$36	$36								
Alloy	$45	$45				$45	(Bethlehem, Massillon, Canton, Coatesville—$45)								
BILLETS, BLOOMS, SLABS							(Provo—$47.20, Duluth—$38[14])								
Carbon, rerolling	$36	$36	$36	$36	$36	$36	$36	$36				$48[14]	$38		
							(Provo—$53.20, Duluth—$44[14])								
Carbon, forging	$42	$42	$42	$42	$42	$42	$42					$54[14]	$44		
Alloy	$54	$54				$54	(Bethlehem, Massillon, Canton—$54)						$56		
SHEET BARS	$36	$36		$36		$36	$36	$36	(Canton—$36)						
PIPE SKELP	1.90¢	1.90¢					1.90¢	1.90¢	(Coatesville—1.90¢)						
WIRE RODS[15]															
No. 5 to 9/32 in.	2.15¢	2.15¢		2.15¢	2.15¢	(Worcester—2.25¢)					2.40¢	2.65¢			
SHEETS															
Hot-rolled	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.30¢	2.20¢		2.75¢	2.30¢	2.44¢	2.37¢
Cold-rolled[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized (24 gage)	3.70¢	3.70¢	3.70¢		3.70¢	3.70¢	3.70¢	3.70¢	3.80¢	3.70¢		4.25¢		3.94¢	3.87¢
Enameling (20 gage)	3.45¢	3.45¢	3.45¢	3.45¢			3.45¢		3.55¢	3.45¢		4.10¢	3.55¢	3.81¢	3.77¢
Long ternes[2]	3.80¢	3.80¢	3.80¢									4.55¢		4.16¢	4.12¢
STRIP															
Hot-rolled[3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢	2.46¢	
Cold-rolled[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester—3.00¢)					2.90¢	3.16¢	
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢							2.56¢	
Commodity cold-rolled	2.95¢	3.05¢		2.95¢			2.95¢	(Worcester—3.35¢)					3.05¢	3.31¢	
TINPLATE															
Standard cokes, base box	$5.00	$5.00	$5.00		$5.10				$5.10					$5.36	$5.32
Electro, box 0.25 lb	$4.35	$4.35	$4.35												
Electro, box 0.50 lb	$4.50	$4.50	$4.50						$4.60						
Electro, box 0.75 lb	$4.65		$4.65						$4.75						
BLACKPLATE															
29 gage[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢[11]			3.37¢
TERNES, MFG.															
Special coated, base box	$4.30	$4.30	$4.30						$4.40						
BARS								(Duluth—2.35¢,							
Carbon steel	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢	2.25	Provo, Utah 2.95¢)			2.60¢	2.90¢	2.35¢	2.59¢	2.57¢
Rail steel[6]	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢					2.60¢	2.90¢			
Reinforcing (billet)[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢	2.25¢	2.39¢	
Reinforcing (rail)[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	2.55¢	2.25¢		2.47¢
Cold-finished[8]	2.75¢	2.75¢	2.75¢	2.75¢		2.75¢			(Detroit—2.80¢)		(Toledo—2.90¢)			3.09¢	3.07¢
Alloy, hot-rolled	2.70¢	2.70¢				2.70¢	2.70	(Bethlehem, Massillon, Canton—2.70¢)					2.80¢		
Alloy, cold-drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.45¢		
PLATES								(Coatesville and Claymont—2.25¢, Provo, Utah 2.95¢)							
Carbon steel[13]	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢		2.25¢	2.25¢			2.60¢	2.80¢	2.47¢	2.44¢	2.30¢
Floor plates	3.50¢	3.50¢									3.85¢	4.15¢		3.86¢	3.82¢
Alloy	3.50¢	3.50¢			(Coatesville—3.50¢)						3.95¢	4.15¢		3.70¢	3.59¢
SHAPES															
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	(Bethlehem—2.10¢)				2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL, C-R															
0.26 to 0.50 carbon	2.80¢			2.80¢			(Worcester—3.00¢)								
0.51 to 0.75 carbon	4.30¢			4.30¢			(Worcester—4.50¢)								
0.76 to 1.00 carbon	6.15¢			6.15¢			(Worcester—6.35¢)								
1.01 to 1.25 carbon	8.35¢			8.35¢			(Worcester—8.55¢)								
WIRE[9]															
Bright[12]	2.75¢	2.75¢		2.75¢	2.75¢		(Worcester—2.85¢)			(Duluth—2.80¢)		3.25¢			3.07¢
Galvanized	Add proper size extra and galvanizing extra to Bright Wire base														
Spring (high carbon)	3.35¢	3.35¢		3.35¢			(Worcester—3.45¢)					3.85¢			3.67¢
PILING															
Steel sheet	2.40¢	2.40¢				2.40¢						2.95¢			2.72¢

CORROSION AND HEAT RESISTANT STEELS

In cents per pound, f.o.b. basing point

BASING POINT	Chromium Nickel		Straight Chromium			
	No. 304	No. 302	No. 410	No. 430	No. 442	No. 446
Ingot, P'gh, Chi, Canton, Balt, Reading, Ft. Wayne, Phila	Subject to negotiation			Subject to negotiation		
Blooms, P'gh, Chi, Canton, Phila, Reading, Ft. Wayne, Balt	21.25	20.40	15.725	16.15	19.125	23.375
Slabs, P'gh, Chi, Canton, Balt, Phila, Reading	21.25	20.40	15.725	16.15	19.125	23.375
Billets, P'gh, Chi, Canton, Newark, N. J., Watervliet, Syracuse, Balt	Subject to negotiation			Subject to negotiation		
Billets, forging, P'gh, Chi, Canton, Dunkirk, Balt, Phila, Reading, Watervliet, Syracuse, Newark, N. J., Ft. Wayne, Titusville	21.25	20.40	15.725	16.15	19.125	23.375
Bars, h-r, P'gh, Chi, Canton, Dunkirk, Watervliet, Newark, N. J., Syracuse, Balt, Phila, Reading, Ft. Wayne, Titusville	25.00	24.00	18.50	19.00	22.50	27.50
Bars, c-f, P'gh, Chi, Cleve, Canton, Dunkirk, Newark, N. J., Syracuse, Balt, Phila, Reading, Ft. Wayne, Watervliet	25.00	24.00	18.50	19.00	22.50	27.50
Plates, P'gh, Middletown, Canton	29.00	27.00	21.50	22.00	26.50	30.50
Shapes, structural, P'gh, Chi	25.00	24.00	18.50	19.00	22.50	27.50
Sheets, P'gh, Chi, Middletown, Canton, Balt	36.00	34.00	26.50	29.00	32.50	36.50
Strip, h-r, P'gh, Chi, Reading, Canton, Youngstown	23.50	21.50	17.00	17.50	24.00	35.00
Strip, c-r, P'gh, Cleve, Newark, N. J., Reading, Canton, Youngstown	30.00	28.00	22.00	22.50	32.00	52.00
Wire, c-d, Cleve, Dunkirk, Syracuse, Balt, Reading, Canton, P'gh, Newark, N. J., Phila	25.00	24.00	18.50	19.00	22.50	27.50
Wire flat, c-r, Cleve, Balt, Reading, Dunkirk, Canton	30.00	28.00	22.00	22.50	32.00	52.00
Rod, h-r, Newark, N. J., Syracuse	25.00	24.00	18.50	19.00	22.50	27.50
Tubing, seamless, P'gh, Chi, Canton, (4 in. to 6 in.)	66.63	66.63	.....	63.30	.....	.....

SHELL STEEL

	per gross ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Basic openhearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.

Prices delivered Detroit are $2.00 higher; East Michigan, $3 higher.

Price Exceptions: Follansbee Steel Corp. permitted to sell at $13.00 per gross ton, f.o.b. Toronto, Ohio, above base price of $52.00.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

ELECTRICAL SHEETS

*Base, f.o.b. Pittsburgh; *f.o.b. Chicago, Gary*

	per lb
Field grade*	3.30¢
Armature*	3.65¢
Electrical*	4.15¢
Motor*	5.05¢
Dynamo	5.75¢
Transformer 72	6.25¢
Transformer 65	7.25¢
Transformer 58	7.75¢
Transformer 52	8.55¢

F.o.b. Granite City, add 10¢ per 100 lb on field grade to and including dynamo; f.o.b. Chicago and Gary, Ind., add 3¢ per 100 lb on field grade through motor. Pacific ports add 75¢ per 100 lb on all grades.

RAILS, TRACK SUPPLIES

(F.o.b. mill)

Standard rails, heavier than 60 lb	
No. 1 O.H., gross ton	$43.00
Angle splice bars, 100 lb	2.70
(F.o.b. basing points)	*per gross ton*
Light rails (from billets)	$45.00
Light rails (from rail steel)	44.00
	base per lb
Cut spikes	3.25¢
Screw spikes	5.40¢
Tie plate, steel	2.30¢
Tie plates, Pacific Coast	2.45¢
Track bolts	4.75¢
Track bolts, heat treated, to railroads	5.00¢
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Chicago, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 25¢.

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse, Dunkirk)

(*Also Canton, O.)	base per lb
High speed	67¢
Straight molybdenum	54¢
Tungsten-molybdenum	57½¢
High-carbon-chromium*	43¢
Oil hardening*	24¢
Special carbon*	22¢
Extra carbon*	18¢
Regular carbon*	14¢

Warehouse prices east of Mississippi are 2¢ per lb higher; west of Mississippi 3¢ higher.

CLAD STEEL

Base prices, cents per pound

	Plate	Sheet
Stainless-clad		
No. 304, 20 pct, f.o.b. Pittsburgh, Washington, Pa.	18.00*	19.00
Nickel-clad		
10 pct, f.o.b. Coatesville, Pa.	18.00	....
Inconel-clad		
10 pct, f.o.b. Coatesville	25.00	....
Monel-clad		
10 pct, f.o.b. Coatesville	24.00	....
Aluminized steel		
Hot dip, 20 gage, f.o.b. Pittsburgh	....	9.00

*Includes annealing and pickling.

WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Basing Points Named	Pacific Coast Basing Points†
	base per keg	
Standard wire nails	$2.90	$3.40
Coated nails	2.90	3.40
Cut nails, carloads	3.85	....
	base per 100 lb	
Annealed fence wire	$3.20	$3.70
Annealed galv. fence wire	3.55	4.05
	base column	
Woven wire fence*	67	85
Fence posts, carloads	69	86
Single loop bale ties	66	91
Galvanized barbed wire**	72	92
Twisted barbless wire	72	....

*15½ gage and heavier. **On 80-rod spools in carload quantities.

†Prices subject to switching or transportation charges.

ROOFING TERNEPLATE

(F.o.b. Pittsburgh, 112 sheets)

	20x14 in.	20x28 in.
8-lb coating I.C.	$6.00	$12.00
15-lb coating I.C.	7.00	14.00
20-lb coating I.C.	7.50	15.00

ALLOY EXTRAS

Alloy Steel	Basic Openhearth		Electric Furnace	
	Bars and Bar-strip	Billets, Blooms, and Slabs	Bars and Bar-strip	Billets, Blooms, and Slabs
NE 8600	0.65¢	$13.00	$1.15	$23.00
NE 8700	0.70	14.00	1.20	24.00
NE 9400	0.75	15.00	1.25	25.00
NE 9700	0.65	13.00	1.15	23.00
NE 9800	1.30	26.00	1.80	36.00
NE 9900	1.20	24.00	1.55	31.00

The extras shown are in addition to the base price of $2.70 per 100 lb on finished products and $54 per gross ton on semifinished steel, major basing points, as shown in table, opposite page, and are in cents per pound when applicable to bars and bar-strip and in dollars per gross ton when applicable to billets, blooms and slabs. When acid openhearth is specified and acceptable, add to basic openhearth alloy differential 0.25¢ per lb for bars and bar-strip and $5 per gross ton for billets, blooms and slabs.

WELDED PIPE AND TUBING

Base discounts, f.o.b. Pittsburgh district and Lorain, Ohio, mills

(F.o.b. Pittsburgh only on wrought pipe) base price—$200.00 per net ton

	Black	Galv.
Steel (buttweld)		
⅛-in.	63½	51
¼-in.	66½	55
⅜-in. to 3-in.	68½	57½
Wrought Iron (buttweld)		
⅛-in.	24	3½
¼-in.	30	10
⅜-in. and 1¼-in.	34	16
1½-in.	38	18½
2-in.	37½	18
Steel (lapweld)		
2-in.	61	49½
2½-in. and 3-in.	64	52½
3½-in. to 6-in.	66	54½
Wrought Iron (lapweld)		
2-in.	30½	12
2½-in. to 3½-in.	31½	14½
4-in.	33½	18
4½-in. to 8-in.	32½	17
Steel (butt, extra strong, plain ends)		
⅛-in.	61½	50½
¼-in.	65½	54½
⅜-in. to 3-in.	67	57
Wrought Iron (same as above)		
⅛-in.	25	6
¼-in.	31	12
⅜-in. to 2-in.	38	19½
Steel (lap, extra strong, plain ends)		
2-in.	59	48½
2½-in. and 3-in.	63	52½
3½-in. to 6-in.	66½	56
Wrought Iron (same as above)		
2-in.	33½	15½
2½-in. to 4-in.	39	22½
4½-in. to 6-in.	37½	21

On buttweld and lapweld steel pipe jobbers are granted a discount of 5 pct. On l.c.l. shipments prices are determined by adding 25 pct and 30 pct and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lapweld and one point lower discount, or $2 a ton higher on all buttweld.

BOILER TUBES

Seamless steel and lapweld commercial boiler tubes and locomotive tubes, minimum wall. Net base prices per 100 ft f.o.b. Pittsburgh, in carload lots.

	Seamless Cold-Drawn	Seamless Hot-Rolled	Lapweld, Hot-Rolled
2 in. O.D. 13 B.W.G.	15.03	13.04	12.38
2½ in. O.D. 12 B.W.G.	20.21	17.54	16.58
3 in. O.D. 12 B.W.G.	22.48	19.50	18.35
3½ in. O.D. 11 B.W.G.	28.37	24.62	23.15
4 in. O.D. 10 B.W.G.	35.20	30.54	28.66

(Extras for less carload quantities)

40,000 lb or ft and over	Base
30,000 lb or ft to 39,999 lb or ft	5 pct
20,000 lb or ft to 29,999 lb or ft	10 pct
10,000 lb or ft to 19,999 lb or ft	20 pct
5,000 lb or ft to 9,999 lb or ft	30 pct
2,000 lb or ft or 4,999 lb or ft	45 pct
Under 2,000 lb or ft	65 pct

CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham	46.00
6-in. and larger, f.o.b. cars, San Francisco or Los Angeles	69.40
6-in. and larger f.o.b. cars, Seattle	71.20

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger are $45 at Birmingham and $53.80 delivered Chicago, $59.40 at San Francisco and Los Angeles, and $70.20 at Seattle. Delivered prices do not reflect 3 pct tax on freight rates.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts

Base discount less case lots

	Percent Off List
½ in. & smaller x 6 in. & shorter	65½
9/16 & ⅝ in. x 6 in. & shorter	63½
¾ to 1 in. x 6 in. & shorter	61
1⅛ in. and larger, all lengths	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)

½ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.

Semifin. Hexagon Nuts	U.S.S.	S.A.E.
Base discount less keg lots		
7/16 in. and smaller	..	64
½ in. and smaller	62	..
½ in. through 1 in.	..	60
9/16 in. through 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full keg lots, 10 pct additional discount.

Stove Bolts	*Consumer*
Packages, nuts loose	71 and 10
In packages	71
In bulk	80

On stove bolts freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago, New York on lots of 200 lb or over.

Large Rivets

(½ in. and larger)

	Base per 100 Lb
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.75

Small Rivets

(7/16 in. and smaller)

	Percent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	65 and 5

Cap and Set Screws	*Consumer Percent Off List*
Upset full fin, hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Fillister head cap, listed sizes	51

Freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago or New York on lots of 200 lb or over.

FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Exception

When the WPB Steel Div. certifies in writing the consumers need for one of the higher grades of metallurgical fluorspar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

Effective CaF_2 Content:	*Base price per short ton*
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

METAL POWDERS

Prices are based on current market prices of ingots plus a fixed figure. F.o.b. shipping point, cents per lb, ton lots.

Copper, electrolytic, 150 and 200 mesh	21½¢ to 23½¢
Copper, reduced, 150 and 200 mesh	20½¢ to 25½¢
Iron, commercial, 100 and 200 mesh 96 + % Fe	12½¢ to 15¢
Iron, crushed, 200 mesh and finer, 90 + % Fe carload lots	4¢
Iron, hydrogen reduced, 300 mesh and finer, 98½ + % Fe, drum lots	63¢
Iron, electrolytic, unannealed, 300 mesh and coarser, 99 + % Fe	30 to 33¢
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	42¢
Iron carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90¢
Aluminum, 100 and 200 mesh	*35¢
Antimony, 100 mesh	30¢
Cadmium, 100 mesh	$1.40
Chromium, 100 mesh and finer	$1.25
Lead, 100, 200 & 300 mesh	11½ to 15¢
Manganese	65¢
Nickel, 150 mesh	51½¢
Solder powder, 100 mesh	8½¢ plus metal
Tin, 100 mesh	58¾¢
Tungsten metal powder, 98%-99%, any quantity, per lb	$2.60
Molybdenum powder, 99%, in 200-lb kegs, f.o.b. York, Pa., per lb	$2.60
Under 100 lb	$3.00

*Freight allowed east of Mississippi.

COKE

Furnace, beehive (f.o.b. oven)	Net Ton
Connellsville, Pa.	$7.50*
Foundry, beehive (f.o.b. oven)	
Fayette Co., W. Va.	8.10
Connellsville, Pa.	9.00
Foundry, Byproduct	
Chicago, del'd	13.75
Chicago, f.o.b.	13.00
New England, del'd	14.65
Kearny, N. J., f.o.b.	13.05
Philadelphia, del'd	13.28
Buffalo, del'd	13.40
Portsmouth, Ohio, f.o.b.	11.50
Painesville, Ohio, f.o.b.	13.15
Erie, del'd	13.15
Cleveland, del'd	13.20
Cincinnati, del'd	13.25
St. Louis, del'd	14.25
Birmingham, del'd	10.90

*Hand drawn ovens using trucked coal permitted to charge $8.60 per ton plus transportation charges.

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick	*Per 1000*
Super-duty brick, St. Louis	$68.50
First quality, Pa., Md., Ky., Mo., Ill.	54.40
First quality, New Jersey	59.35
Sec. quality, Pa., Md., Ky., Mo., Ill.	49.35
Sec. quality, New Jersey	51.95
No. 1 Ohio	45.60
Ground fire clay, net ton	8.05

Silica Brick	
Pennsylvania and Birmingham	$54.40
Chicago District	62.45
Silica cement, net ton (Eastern)	9.55

Chrome Brick	*Per Net Ton*
Standard chemically bonded, Balt., Plymouth Meeting, Chester	$54.00

Magnesite Brick	
Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	66.00

Grain Magnesite	
Domestic, f.o.b. Balt. and Chester in sacks (carloads)	$43.45
Domestic, f.o.b. Chewelah, Wash. in bulk	22.00
in sacks	26.00

LAKE SUPERIOR ORES

(51.50% Fe, Natural Content, Delivered Lower Lake Ports)*

	Per Gross Ton
Old range, bessemer, 51.50	$4.95
Old range, non-bessemer, 51.50	4.80
Mesaba, bessemer, 51.50	4.70
Mesaba, non-bessemer 51.50	4.55
High phosphorus, 51.50	4.55

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

WAREHOUSE PRICES

Delivered metropolitan areas per 100 lb. These are zoned warehouse prices in conformance with latest zoning amendment to OPA Price Schedule 49.

Cities	SHEETS			STRIP		Plates ¼ in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled, NE 8617-20	Hot Rolled, NE 9442-45 Ann.	Cold Drawn, NE 8617-20	Cold Drawn, NE 9442-48 Ann.
**Philadelphia	$3.518	$4.872[5]	$4.768[a]	$3.922	$4.772	$3.605	$3.666	$3.822	$4.172	$5.816	$6.866	$7.072	$8.172
New York	3.59	4.613[3]	5.110	3.974[6]	4.772	3.768	3.758	3.853	4.203	5.858	6.908	7.103	8.203
Boston	3.744	4.744[9]	5.224[9]	4.106	4.715	3.912	3.912	4.044	4.244	6.012	7.062	7.194	8.394
Baltimore	3.394	4.852	4.894	3.902	4.752	3.594	3.759	3.802	4.152	....	....	....	....
Norfolk	3.771	4.965	5.371	4.165	4.865	3.971	4.002	4.065	4.265	....	....	....	....
Chicago	3.25	4.20	5.231	3.60	4.65[17]	3.55	3.55	3.50	3.85	5.60	6.65	6.65	7.90
Milwaukee	3.387	4.337[3]	5.272[4]	3.737	4.787[17]	3.687	3.687	3.637	3.987	5.837	6.887	6.887	7.987
Cleveland	3.35	4.40	4.877[4]	3.60	4.45	3.40	3.588	3.35	3.85	5.806	6.856	6.65	7.75
Buffalo	3.35	4.40	4.75[4]	3.819	4.669	3.63	3.40	3.35	3.85	5.60	6.65	6.65	7.75
Detroit	3.45	4.50	5.00[4]	3.70	4.859[17]	3.609	3.661	3.45	3.90	5.93	6.98	6.959	8.059
Cincinnati	3.425	4.475[3]	4.825[5]	3.675	4.711	3.661	3.691	3.611	4.111	5.95	7.00	7.011	8.261
St. Louis	3.397	4.347[3]	5.172[4]	3.747	4.931[17]	3.697	3.697	3.647	4.131	5.981	7.031	7.031	8.131
Pittsburgh	3.35	4.40	4.75	3.60	4.45	3.40	3.40	3.35	3.85	5.60	6.65	6.65	7.90
St. Paul	3.50	4.46	5.257[4]	3.86	5.102[17]	3.81[13]	3.81[13]	3.76[13]	3.461	5.94	5.99	7.361	8.461
Omaha	3.865	5.443	5.608[4]	4.215	....	4.165	4.165	4.115	4.543	....	....	....	....
Indianapolis	3.518	4.568	4.918	3.768	4.741	3.63	3.63	3.58	4.00	5.93	6.98	6.98	8.23
Birmingham	3.45	....	4.75	3.70	....	3.55	3.55	3.50	4.53	....	....	....	....
Memphis	3.965[7]	4.66	5.268	4.215	....	4.065	4.065	4.015	4.33	....	....	....	....
New Orleans	4.058*	5.079	5.358	4.308	....	4.158	4.158*	4.108*	4.729	....	....	....	....
Houston	3.763	5.573	6.313[1]	4.313	....	4.25	4.25	3.75	6.473[3]	7.223	8.323	8.323	9.373
Los Angeles	5.00	7.20[3]	6.10[4]	4.95	5.613[15]	4.95	4.65	4.40	5.683	8.204	9.404	9.304	10.454
San Francisco	4.55[14]	7.30[4]	6.35[4]	4.50[14]	7.333[17]	4.65[14]	4.35[14]	4.15[14]	5.433	8.304	9.404	9.404	10.454
Seattle	4.65[12]	7.05[4]	5.95[4]	4.25[12]	....	4.75[12]	4.45[12]	4.35[12]	5.883	....	9.404	....	....
Portland	4.65[11]	6.60[4]	5.75[4]	4.75[11]	....	4.85[11]	4.45[11]	4.45[11]	5.633	8.304	9.404	8.304	9.404
Salt Lake City	4.530[17]	....	6.17[13]	5.53[17]	....	4.98[17]	4.98[17]	4.88[17]	6.00	....	....	....	....

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT-ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD-ROLLED: Sheets, 400 to 1499 lb; strip, extras on all quantities; bars, 1500 lb base.

NE ALLOY BARS: 1000 to 39,999 lb.

EXCEPTIONS: (1) 150 to 499 lb. (2) 150 to 1499 lb. (3) 400 to 1499 lb. (4) 450 to 1499 lb. (5) 500 to 1499 lb. (6) 0 to 199 lb. (7) 400 to 1499 lb. (8) 1000 to 1999 lb. (9) 450 to 3749 lb. (10) 400 to 3999 lb. (11) 300 to 4999 lb. (12) 300 to 10,000 lb. (13) 400 to 14,999 lb. (14) 400 lb and over. (15) 1000 lb and over. (16) 1500 lb and over. (17) 2000 lb and over. (18) 3500 lb and over.

([a]) Philadelphia: Galvanized sheet, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

*Add 0.271¢ for sizes not rolled in Birmingham.

**City of Philadelphia only. Applicable freight rates must be added to basing point prices to obtain delivered price to other localities in metropolitan area.

PIG IRON PRICES

Maximum per gross ton, established by OPA Oct. 22, 1945. Prices do not reflect 3 pct tax on freight.

BASING POINT PRICES						DELIVERED PRICES (BASE GRADES)							
Basing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.	Consuming Point	Basing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	$26.25	$26.75	$27.25	$27.75	....	Boston	Everett	$ .50	$26.75	$27.25	$27.75	$28.25	....
Birdsboro	26.25	26.75	27.25	27.75	$31.25	Boston	Birdsboro-Steelton	4.02	....	....	....	....	$35.27
Birmingham	20.75	22.13	....	26.75	....	Brooklyn	Bethlehem	2.50	28.75	29.25	29.75	30.25	....
Buffalo	24.75	25.75	26.25	26.75	31.25	Brooklyn	Birdsboro	2.92	....	....	....	....	34.17
Chicago	25.25	25.75	25.75	26.25	....	Canton	Cle,Yngstn, Sharpsvll.	1.39	26.64	27.14	27.14	27.64	....
Cleveland	25.25	25.75	25.75	26.25	....	Canton	Buffalo	3.19	....	....	....	....	34.44
Detroit	25.25	25.75	25.75	26.25	....	Cincinnati	Birmingham	4.06	24.81	26.19	....	....	....
Duluth	25.75	26.25	26.25	26.75	....	Cincinnati	Hamilton	1.11	....	....	26.86	....	....
Erie	25.25	25.75	26.25	26.75	....	Cincinnati	Buffalo	4.40	....	....	....	....	35.65
Everett	26.25	26.75	27.25	27.75	....	Jersey City	Bethlehem	1.53	27.78	28.28	28.78	29.28	....
Granite City	25.25	25.75	25.75	26.25	....	Jersey City	Birdsboro	1.94	....	....	....	....	33.19
Hamilton	25.25	25.75	25.75	....	....	Los Angeles	Provo	4.95	28.20	28.70	....	....	....
Neville Island	25.25	25.75	25.75	26.25	....	Los Angeles	Buffalo	15.41	....	....	....	....	46.66
Provo	23.25	23.75	....	....	....	Mansfield	Cleveland & Toledo	1.94	27.19	27.69	27.69	28.19	....
Sharpsville [1]	25.25	25.75	25.75	26.25	....	Mansfield	Buffalo	3.36	....	....	....	....	34.61
Sparrows Point	26.25	26.75	....	....	....	Philadelphia	Swedeland	.84	27.09	27.59	28.09	28.59	....
Steelton	26.25	....	....	....	31.25	Philadelphia	Birdsboro	1.24	....	....	....	....	32.49
Swedeland	26.25	26.75	27.25	27.75	....	San Francisco	Provo	4.95	28.20	28.70	....	....	....
Toledo	25.25	25.75	25.75	26.25	....	San Francisco	Buffalo	15.41	....	....	....	....	46.66
Youngstown	25.25	25.75	25.75	26.25	....	Seattle	Provo	4.95	28.20	28.70	....	....	....
						Seattle	Buffalo	15.41	....	....	....	....	46.66
						St. Louis	Granite City	.50	25.75	26.25	26.25	26.75	....
						St. Louis	Buffalo	7.07	....	....	....	....	38.32

(1) Struthers Iron & Steel Co., Struthers, Ohio, may charge 50¢ a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

Charcoal pig iron base prices for Lyles, Tenn., and Lake Superior furnaces, $33.00 and $34.00, respectively. Newberry Brand of Lake Superior charcoal iron $39.00 per g.t., f.o.b. furnace, by order L 39 to RPS 10. Apr. 11, 1945, retroactive to Mar. 7, 1945. Delivered to Chicago, $42.34. High phosphorus iron sells at Lyles, Tenn., at $28.50.

Basing point prices are subject to switching charges; Silicon differentials (not to exceed 50¢ a ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct); Phosphorus differentials, a reduction of 38¢ per ton for phosphorus content of 0.70 pct and over; Manganese differentials, a charge not to exceed 50¢ per ton for each 0.50 pct manganese content in excess of 1.00 pct. Effective Mar. 3, 1943, $2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and $1 per ton extra for each additional 0.25 pct nickel.

Silvery iron and bessemer ferrosilicon up to and including 14.00 pct silicon covered by RPS 10 as amended Feb. 14, 1945. Silvery iron, silicon 6.00 to 6.50 pct, C/L per g.t., f.o.b. Jackson, Ohio—$31.25; f.o.b. Buffalo—$32.50. Add $1.00 per ton for each additional 0.50 pct Si. Add 50¢ per ton for each 0.50 pct Mn over 1.00 pct. Add $1.00 per ton for prices of comparable analysis.

Ferromanganese

78-82% Mn, maximum contract base price per gross ton, lump size, f.o.b. car at Baltimore, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Less ton lots (packed)	148.50
F.o.b. Pittsburgh	139.50

$1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Ferromanganese Briquets

Contract prices per pound of briquet, f.o.b. shipping point, freight allowed to destination. Approx. 66% contained Mn. Add 0.25¢ for spot sales.

	Eastern	Central	Western
Carload, bulk	6.05¢	6.30¢	6.60¢
Ton lots	6.65¢	7.55¢	8.55¢
Less ton lots	6.80¢	7.80¢	8.80¢

Manganese Metal

Contract basis, lump size, per pound of metal, f.o.b. shipping point with freight allowed. Spot sales add 2¢ per lb.

96-98% Mn, .2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk	30¢
L.c.l. lots	32¢

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads	34¢
Ton lots	36¢
Less ton lots	38¢

Spiegeleisen

Maximum base contract prices per gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$35.00	$36.00
Less ton	47.50	48.50
F.o.b. Pittsburgh, Chicago	40.00	

Low-Carbon Ferromanganese

Contract prices per pound of manganese contained, lump size, f.o.b. shipping point, freight allowed to destination, eastern zone. Add 0.25¢ for spot sales.

	Carloads, Ton	Less
0.06% C, 0.06% P, 90% Mn	23.00¢	23.40¢ 23.65¢
0.10% max. C, 1% or 2% max. Si	23.00¢	23.40¢ 23.65¢
0.15% max. C, 1% or 2% max. Si	22.00¢	22.40¢ 22.65¢
0.30% max. C, 1% or 2% max. Si	21.00¢	21.40¢ 21.65¢
0.50% max. C, 1% or 2% max. Si	20.00¢	20.40¢ 20.65¢
0.75% max. C, 7.00% max. Si	16.00¢	16.40¢ 16.65¢

Electric Ferrosilicon

OPA maximum base price cents per pound contained Si, lump size in carloads, f.o.b. shipping point with freight allowed.

	Eastern	Central	Western
50% Si	6.65¢	7.10¢	7.25¢
75% Si	8.05¢	8.20¢	8.75¢
80-90% Si	8.90¢	9.05¢	9.55¢
90-95% Si	11.05¢	11.20¢	11.65¢

Silvery Iron

Si 14.01 to 14.50%, $45.50 per G. T. f.o.b. Jackson, Ohio; $48.75 f.o.b. Keokuk, Iowa; $46.75 f.o.b. Niagara Falls. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add $1.00 per ton for low impurities, not to exceed: P—0.05%, S—0.04%, C—1.00%. Covered by MPR 405.

Silicon Metal

OPA maximum base price per pound of contained Si, lump size, f.o.b. shipping point with freight allowed to destination, for l.c.l. above 2000 lb, packed. Add 0.25¢ for spot sales.

	Eastern	Central	Western
96% Si, 2% Fe	13.10¢	13.55¢	16.50¢
97% Si, 1% Fe	13.45¢	13.90¢	16.80¢

Ferrosilicon Briquets

OPA maximum base price per pound of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% Si. Add 25¢ for spot sales.

	Eastern	Central	Western
Carload, bulk	3.35¢	3.50¢	3.65¢
2000 lb-carload	3.80¢	4.20¢	4.25¢

Silicomanganese

Contract basis lump size, per pound of metal, f.o.b. shipping point with freight allowed. Add 25¢ for spot sales. 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk	6.05¢
2000 lb to carload	6.70¢
Briquet, contract basis, carlots, bulk freight allowed, per lb	5.80¢
2000 lb to carload	6.30¢
Less ton lots	6.55¢

Ferrochrome

(65-72% *Cr, 2% max. Si*)

OPA maximum base contract prices per pound of contained Cr, lump size in carload lots, f.o.b. shipping point, freight allowed to destination. Add 0.25¢ per lb contained Cr for spot sales.

	Eastern	Central	Western
0.06% C	23.00¢	23.40¢	24.00¢
0.10% C	22.50¢	22.90¢	23.50¢
0.15% C	22.00¢	22.40¢	23.00¢
0.20% C	21.50¢	21.90¢	22.50¢
0.50% C	21.00¢	21.40¢	22.00¢
1.00% C	20.50¢	20.90¢	21.50¢
2.00% C	19.50¢	19.90¢	21.00¢
66-71% Cr, 4-10% C	13.00¢	13.40¢	14.00¢
62-66% Cr, 5-7% C	13.50¢	13.90¢	14.50¢

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2¢ per lb to regular low-carbon ferrochrome price schedule. Add 2¢ for each additional 0.25% N. High-carbon type: 66-71% Cr, 4-5% C, 0.75% N. Add 5¢ per lb to regular high-carbon ferrochrome price schedule.

Ferrochrome Briquets

Contract prices per pound of briquet, f.o.b. shipping point, freight allowed to destination. Approx. 60% contained chromium. Add 0.25¢ for spot sales.

	Eastern	Central	Western
Carload, bulk	8.25¢	8.55¢	8.95¢
Ton lots	8.75¢	9.25¢	10.75¢
Less ton lots	9.00¢	9.50¢	11.00¢

Calcium—Manganese—Silicon

Contract prices per pound of alloy, lump size, f.o.b. shipping point, freight allowed to destination.

16-20% Ca, 14-18% Mn, 53-59% Si. Add 0.25¢ for spot sales.

	Eastern	Central	Western
Carloads	15.50¢	16.00¢	18.05¢
Ton lots	16.50¢	17.35¢	19.10¢
Less ton lots	17.00¢	17.35¢	19.60¢

Calcium Metal

Eastern zone contract prices per pound of metal, f.o.b. shipping point, freight allowed to destination. Add 5¢ for spot sales. Add 0.9¢ for central zone; 0.49¢ for western zone.

	Cast	Turnings	Distilled
Ton lots	$1.80	$2.30	$5.00
Less ton lots	2.30	2.80	5.75

Chromium—Copper

Contract price per pound of alloy, f.o.b. Niagara Falls, freight allowed east of the Mississippi. 8-11% Cr, 88-90% Cu, 1.00% max. Fe, 0.50% max. Si. Add 2¢ for spot sales.

Shot or ingot	45¢

Ferroboron

Contract prices per pound of alloy, f.o.b. shipping point, freight allowed to destination. Add 5¢ for spot sales. 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% Max. C.

	Eastern	Central	Western
Ton lots	$1.20	$1.2075	$1.229
Less ton lots	1.30	1.3075	1.329

Manganese—Boron

Contract prices per pound of alloy, f.o.b. shipping point, freight charges allowed. Add 5¢ for spot sales.

75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C.

	Eastern	Central	Western
Ton lots	$1.89	$1.903	$1.935
Less ton lots	2.01	2.023	2.055

Nickel—Boron

Spot and contract prices per pound of alloy, f.o.b. shipping point, freight allowed to destination.

15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.

	Eastern	Central	Western
11,200 lb or more	$1.90	$1.9125	$1.9445
Ton lots	2.00	2.09125	2.0445
Less ton lots	2.10	2.1125	2.1445

Other Ferroalloys

Ferrotungsten, standard grade lump or ¼X down, packed f.o.b. plant at Niagara Falls, New York, Washington, Pa., York, Pa., per pound contained tungsten, 10,000 lb or more	$1.90
Ferrovanadium, 35-55%, contract basis, f.o.b. plant, usual freight allowances, per pound contained V.	
Openhearth	$2.70
Crucible	$2.80
Primos	$2.90
Cobalt, 97% min., keg packed, contract basis, f.o.b. producers plant, usual freight allowances, per pound of cobalt metal	$1.50
Vanadium pentoxide, 88-92% V_2O_5 technical grade, contract basis, any quantity, per pound conatined V_2O_5. Spot sales add 5¢ per lb contained V_2O_5	$1.10
Silcaz No. 3, contract basis, f.o.b. plant with usual freight allowances, per pound of alloy.	
carload lots	25¢
2000 lb to carload	26¢
Silvaz No. 3, contract basis, f.o.b. plant with freight allowances, per pound of alloy.	
Carload lots	58¢
2000 lb to carload	59¢
Grainal, f.o.b. Bridgeville, Pa., freight allowed 50 lb and over, max. based on rate to St. Louis	
No. 1	87.5¢
No. 6	60¢
No. 79	45¢
Bortram, f.o.b. Niagara Falls	
Ton lots, per lb	45¢
Less ton lots, per lb	50¢
Ferrocolumbium, 50-60%, contract basis, f.o.b. plant with freight allowances, per pound contained Cb.	
2000-lb lots	$2.25
Under 2000-lb lots	$2.30
Ferrotitanium, 40-45%, 0.10%C. max. f.o.b. Niagara Falls, N. Y., ton lots, per pound contained Ti	$1.23
Less ton lots	$1.25
Ferrotitanium, 20-25%, 0.10%C. max., ton lots, per pound contained titanium	$1.35
Less ton lots	$1.40
High-carbon ferrotitanium, 15-20%, 6-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y. freight allowed east of Mississippi, north of Baltimore and St. Louis, per carload	$142.50
Ferrophosphorus, 18% electric or blast furnaces, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equalled with Rockdale, Tenn., per gross ton	$58.50
Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., $3 unitage freight equalized with Nashville, per gross ton	$75.00
Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., any quantity, per pound contained Mo.	95¢
Calcium molybdate, 40-45%, f.o.b. Langeloth and Washington, Pa., any quantity, per pound contained Mo	80¢
Molybdenum oxide briquets, 48-52% Mo g.o.b. Langeloth, Pa., per pound contained Mo	80¢
Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per pound contained Mo	80¢
Zirconium, 35-40%, contract basis, f.o.b. producer's plant with freight allowances, per pound of alloy. Add ¼¢ for spot sales	
Carload lots	14¢
Zirconium, 12-15%, contract basis, lump f.o.b. plant usual freight allowances, per pound of alloy	
Carload, bulk	4.60¢
Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, carload, bulk	5.75¢
Ton lots	7.25¢
Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, f.o.b. Philo, Ohio, with freight not to exceed St. Louis rate allowed, per pound.	
Car lots	8.00¢
Ton lots	8.75¢
Less ton lots	9.25¢

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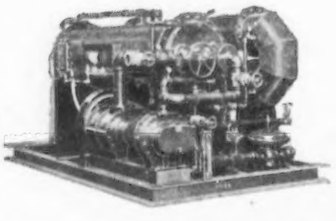

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White Motor Acquires New $2½ Million Plant To Expand Bus Output

Cleveland

• • • **The White Motor Co. has** completed plans for a new $2½ million plant in Cleveland for the production of White's full line of new postwar bus models for city, inter-city, and school use. Announcement of the expansion was made following approval by Surplus Property Div. of the Reconstruction Finance Corp. of White's offer to buy the plant and general office buildings of the Nottingham Equipment Works of the General Electric Co.

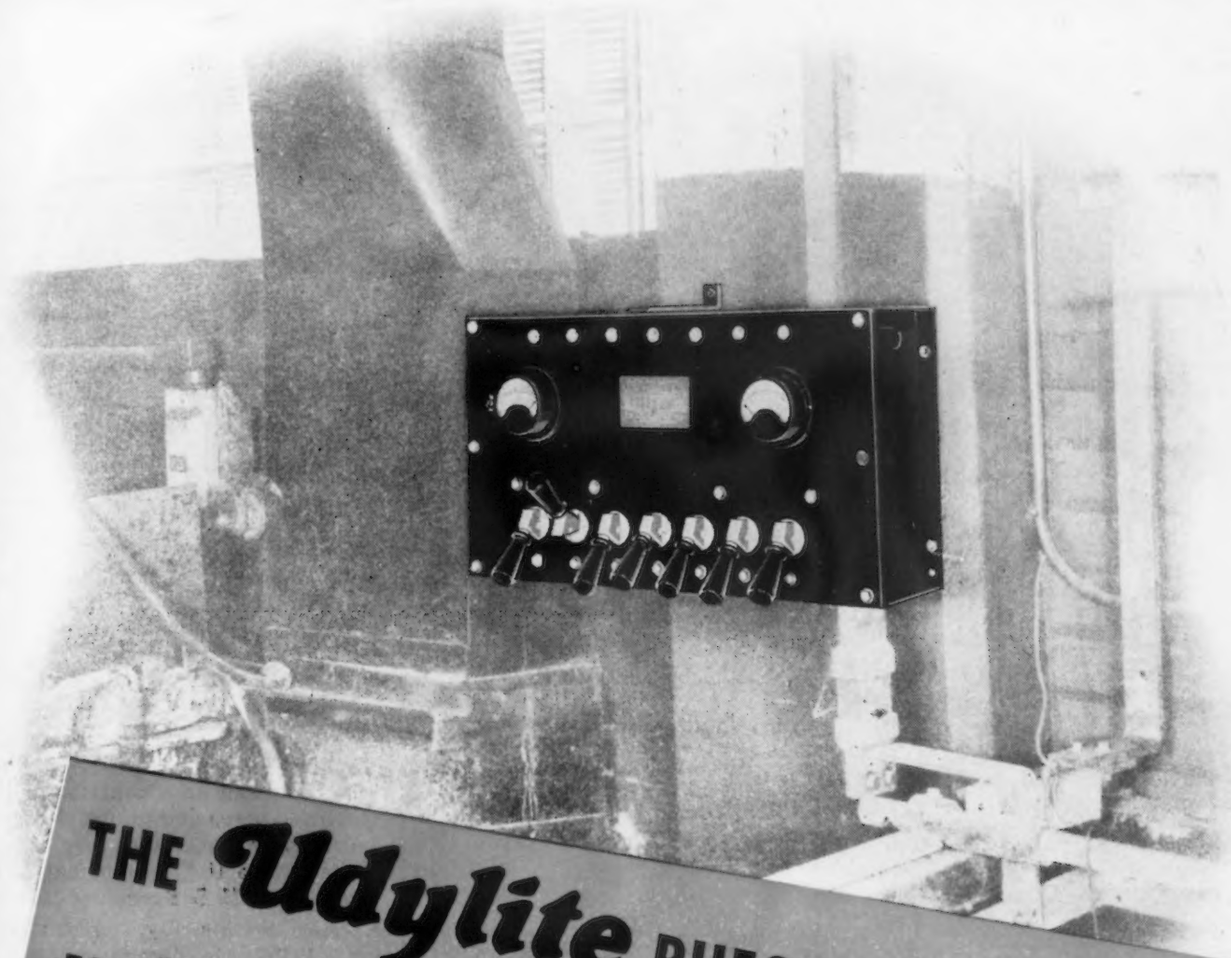
The new plant will employ between 1000 and 1200 under full operation, as soon as additions to double the present production area of about 180,000 sq ft are completed and machinery installed.

White has a backlog of approximately $14 million worth of urgently needed city transit busses, Robert F. Black said in announcing the expansion. This includes orders from approximately 100 customers distributed uniformly throughout the major cities in the United States, including Cleveland.

White busses have hitherto been manufactured in a part of the White Motor plant at St. Clair and East 79th St. Approximately 500 workers have been employed in the bus division. The transfer of the bus division to the new plant on East 185th St. will also enable the company to expand its truck manufacturing facilities which will occupy the entire 79th St. plant.

White's new line of postwar busses will range from 27-passenger, 6-cylinder vehicles for suburban and feeder-line use to 45-passenger, 12-cylinder underfloor engine highway and city transit types.

In addition to the regular White line of 12-cylinder Super Power engine busses of 40 and 44 or 45-passenger capacity, there will be 32- and 36-passenger models, powered by a White Super Power 6-cylinder engine developing approximately 175 hp.



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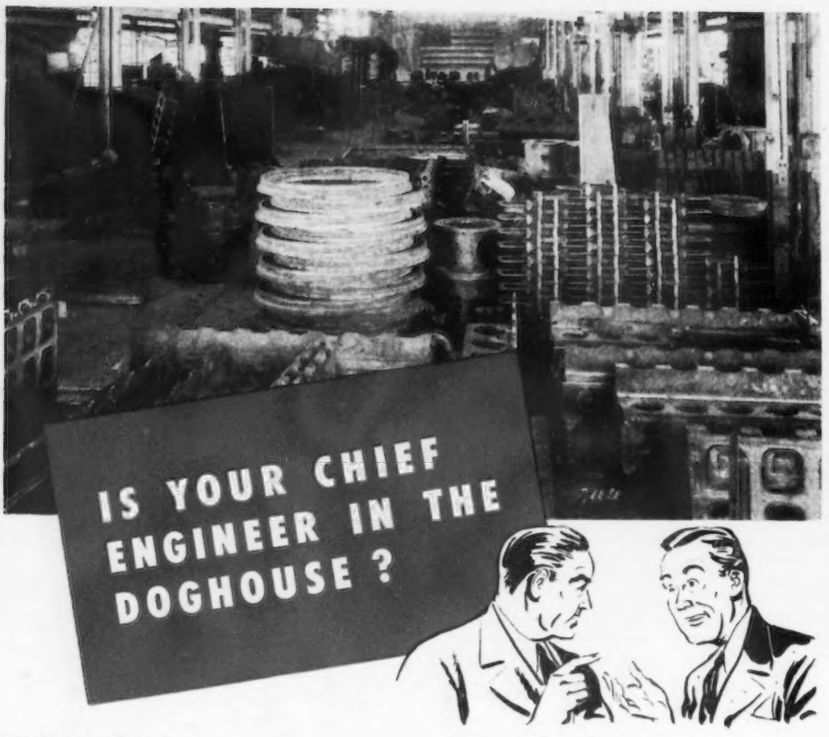

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Dr. R. J. Lund Joins Battelle Inst. Staff

Columbus, Ohio

• • • **Dr. Richard J. Lund,** mineral economist and geologist and one-time director of the Miscellaneous Minerals Div. of the War Production Board, has joined the staff of Battelle Institute, Columbus, Ohio. According to an announcement by Clyde Williams, Battelle director, Dr. Lund will play a leading role in the institute's expanding studies of technical-economic problems.

Dr. R. J. Lund

Until recently associated with the Reynolds Metals Co. as director of basic research, Dr. Lund is widely known as a contributor to the trade press and to professional journals and as the author of reports by the U. S. Geological Survey and the U. S. Bureau of Mines.

Prior to his 3-yr association with WPB, Dr. Lund served as consultant on miscellaneous minerals to the old Office of Production Management and Defense Commission, and earlier was for three years editor of the *Mining Congress Journal.*

Home Unit Contracts Higher in November

New York

• • • **F. W. Dodge Corp.** reported recently that contracts were awarded in November for 10,953 new dwelling units to cost $72,577,000 in the 37 states east of the Rocky Mountains. This was the largest number of new units to figure in contracts awarded in a single month since December 1943, and the largest monthly dollar volume for such construction since June 1942, according to the corporation.

While contracts in both December 1943 and June 1942 involved a considerable amount of public housing, only 1 pct of November's total fell into that category. The

November dollar volume of privately owned residential building exceeds that for any month since April 1942, the corporation reported.

Contracts were awarded in November in the eastern states for 15,481 new construction projects of all kinds involving an expenditure of $370,087,000. Of this total $207,671,000 was for nonresidential building, principally structures to be used for manufacturing purposes. November construction advanced 17 pct above October's total and was 124 pct higher than in November 1944, the corporation reported.

Dollar volume of all construction contracts in the 37 eastern states during the first 11 months of this year totaled $2,968,618,000 compared to $1,805,535,000 in the corresponding period of last year.

Canadian Firm Halts Output of Steel Tubes

Ottawa

• • • **Page-Hersey** Tubes Ltd., Welland, Ont., has notified customers that "until such time as conditions may develop which will permit the operation of our seamless tube mills on a fair and reasonable basis, we are compelled to discontinue manufacture of the products." This action was taken following the withdrawal of the budget tariff protection of Canadian-made steel tubes.

The protection on steel tubes was provided in the budget of Oct. 12, and followed representation from Page-Hersey Tubes Ltd. Finance Minister Ilsley announced Nov. 12, the government had decided to drop the tariff changes proposed in the budget and to restore the old rate because it has "solid" reasons for believing that substantial reductions in world tariffs may soon be under active discussion.

The budget included resolutions striking out 29 tariff items and susbstituting 33 in their place. Some of the adjustments were increases, some were decreases and some were reclassifications and clarifications. The tariff items which started widespread controversy dealt with protection to producers of steel and wrought iron tubes of a class or kind made in Canada on which a 20 pct ad valorem duty was imposed.

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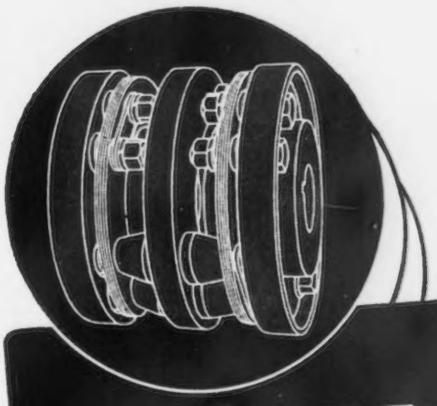
.... are specified by engineers, wherever 100% Operating Efficiency is demanded



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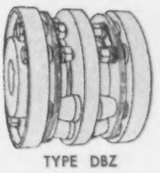
Flexible COUPLINGS
provide for
Angular and Parallel Misalignment as well as Free End Float . . .
and Eliminate
BACKLASH, FRICTION, WEAR and CROSS-PULL
NO LUBRICATION IS REQUIRED!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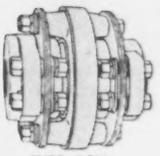
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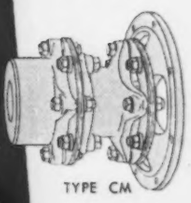
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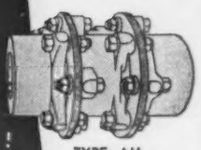
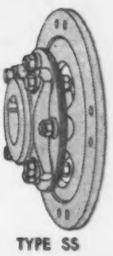

TYPE AM

The Thomas All-Metal Coupling does not depend on springs, gears, rubber or grids to drive. All power is transmitted by direct pull.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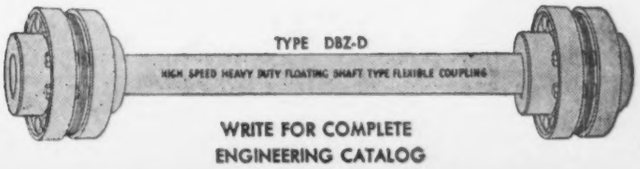

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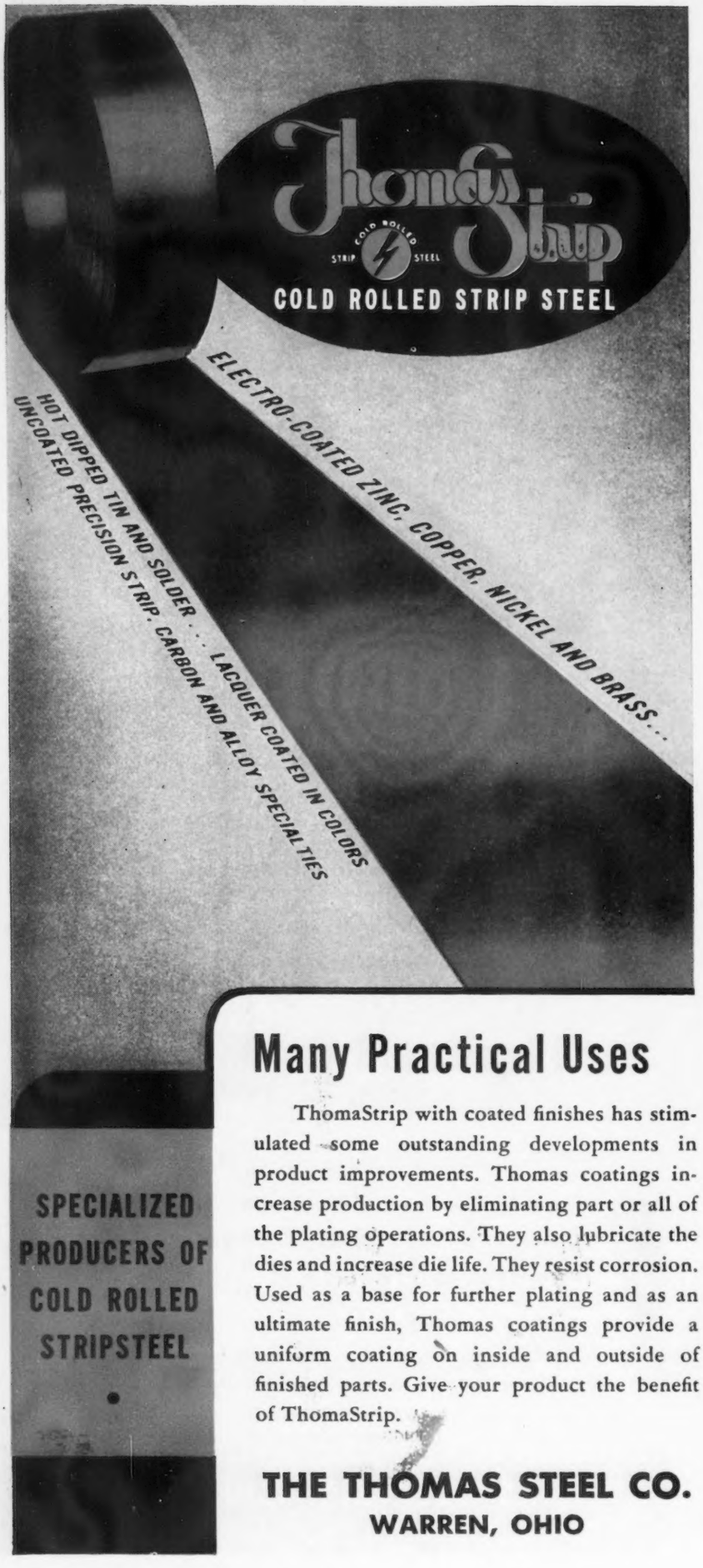
THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA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ELECTRO-COATED ZINC, COPPER, NICKEL AND BRASS...
HOT DIPPED TIN AND SOLDER . . . LACQUER COATED IN COLORS
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ThomaStrip with coated finishes has stimulated some outstanding developments in product improvements. Thomas coatings increase production by eliminating part or all of the plating operations. They also lubricate the dies and increase die life. They resist corrosion. Used as a base for further plating and as an ultimate finish, Thomas coatings provide a uniform coating on inside and outside of finished parts. Give your product the benefit of ThomaStrip.
THE THOMAS STEEL CO.
WARREN, OHIO

Canada Now to Depend Largely Upon Exports To Hold Income Level

Ottawa

• • • **C. D. Howe,** Minister of the Dept. of Reconstruction, in his year-end survey, stated that Canada has attained industrial maturity and hereafter the maintenance of a high level of national employment and income will depend to a greater extent than heretofore on export markets for manufactured products and proportionately less on farm products exports, although the latter will remain important.

This means that Canadians will stop thinking of their country as primarily agricultural and remember that it has become a great manufacturing nation requiring markets throughout the world. Attainment of maturity by this country's maunfacturing plants is a consequence of the war and although warranting pride on the part of Canadians it confronts them with a new set of economic problems of the first magnitude.

The survey states: "The most striking result of the war in Canada is to be found in the fact that within six years the economic and social picture has changed, owing to the rapid expansion of productive capacity in maunfacturing industries. Today Canada stands ready and equipped to produce more goods than at any previous period. The expansion has been on a scale that far exceeds the possibilities of domestic consumption and markets abroad are necessary to keep Canadian industrial facilities operating at levels approaching their new capacity.

Canada's transformation from a predominantly agricultural country to that of a great industrial nation is disclosed in the following statistics which reveal that in 1919 agriculture contributed $1,457,429,000 or 44 pct of the value of production of all Canadian industries, as compared to $1,095,601,000 or 33 pct by manufacturing (mining, forestry, fishing, etc. excluded). By 1939 manufacturing contributed $1,277,265,000 or 39 pct of the total net value of production in the country, against $826,390,000 or 22 pct contributed by agriculture. In 1943 the net

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STEEL CASTINGS

HALF THERE IN SIZE, BUT
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This huge electrical generator casting weighs about 40,000 pounds. It's only half of the "spider" on which the windings go, but the casting *quality* is no half measure. PSF's controlled methods and advanced technique assure uniform strength, correct grain structure and complete fidelity to "specs"... complete *satisfaction* for any steel casting user.

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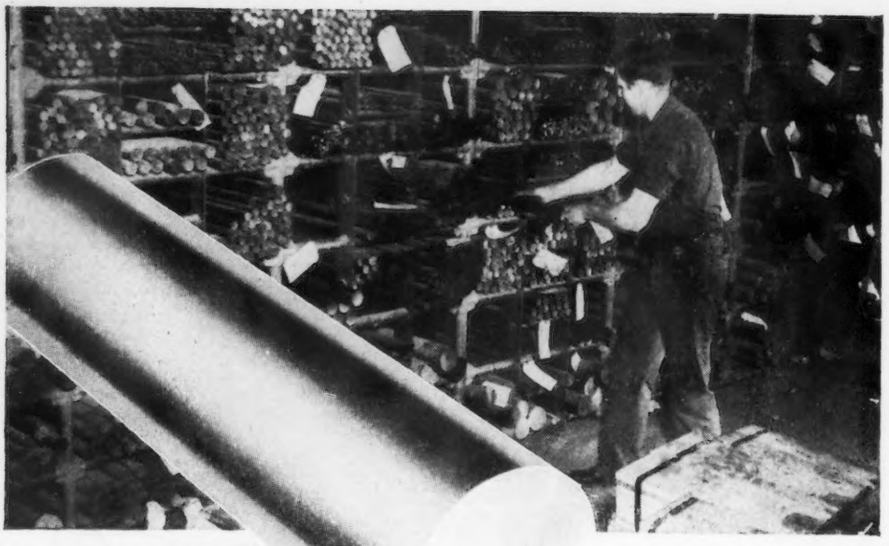

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...for higher strength...good surface finish...compact structure

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Two grades of Ampco Metal and two grades of Ampcoloy bronze are produced in extruded form at Ampco Metal, Inc.

Extruded Ampco products are available from a modern extrusion mill, with the largest extrusion press in the Middle West and one of the few in the world devoted exclusively to the extrusion of aluminum bronze.

Barstock, heavy walled tubing, and various shapes are provided to meet your needs—from a mill that contains all the modern equipment required to handle this type of work.

The quality of Ampco extruded stock reflects care and consideration of detail in each step of the process—controlled melting and alloying, exact billet casting and billet heating technique, plus careful inspection of the finished product.

AMPCO Metal
The Metal without an Equal

Specialists in engineering production — finishing of copper-base alloy parts.

Write for **Bulletin 64A**

It gives you valuable information about Ampco extruded products.

Ampco Metal, Inc.

Department IA-1 Milwaukee 4, Wisconsin

Ampco Field Offices in Principal Cities

A-23

output of manufacturing had risen to $3,405,712,000 or 54 pct of total commodity production while agriculture accounted for $1,204,843,000 or 20 pct of the total net output.

Government and private investment in new industrial plants during the war amounted to $1,200,000,000 and it is estimated that two-thirds of this or about $800,000,000 of plant and equipment can be converted to civilian goods production.

Canada's industrial expansion has been on a scale that far exceeds the possibilities of domestic consumption and markets abroad are necessary to keep Canadian industrial facilities operating at levels approaching a new capacity. A change can be expected, therefore, in the relative importance of the items comprising Canadian export trade, with manufactured products making a larger contribution to the total volume and value of export trade and hence to the national level of employment and income.

Extends Interim Prices For Construction Group

Washington

• • • **Sellers of construction** machinery and equipment who have increased their ceiling prices by 5 pct in line with the 5 pct interim increase in prices authorized last Sept. 28, may continue to make deliveries at the higher prices through Jan. 31, OPA has announced. It was the intent of OPA to supply the industry with a permanent increase factor before the end of 1945, and for that reason, the interim price increase as originally authorized, would have expired on Dec. 31. Submission of data by the industry was slower than expected, OPA said.

Very shortly, however, OPA is to supply the industry with a basis for calculating permanent prices which will replace the interim price increase, and this action is designed to give manufacturers an opportunity to revise their price lists in an orderly manner when the new price calculating basis comes along.

Dr. Noyes Made 1947 ASC President-Elect

New York

• • • **Dr. W. Albert Noyes, Jr.,** chairman of the chemistry dept. of the University of Rochester, has been elected president of the American Chemical Society for 1947, it has been announced.

Dr. Noyes took office as president-elect on Jan. 1, when Col. Bradley Dewey, president of the Dewey & Almy Chemical Co., Cambridge, Mass., and former rubber director, becomes president, succeeding Dr. Carl Shipp Marvel, professor of organic chemistry at the University of Illinois.

The new president-elect was chosen by the society's council from four nominees receiving the largest number of votes in a national mail ballot of the society's 43,000 members.

Three directors also were named by the Council. Dr. Charles A. Thomas, vice-president of the Monsanto Chemical Co., St. Louis, Mo., was re-elected director-at-large. Dr. Charles L. Parsons of Washington, D. C., secretary of the society for 38 yr and its business manager for 14, was chosen as regional director for the Fourth District.

•

Retires From ACS Offices

New York

• • • **Dr. Charles Lathrop Parsons** of Washington, D. C., secretary of the American Chemical Society since 1907 and its business manager since 1931, retired recently from both offices.

Dr. Parsons, 78, and one of the most widely known members of the American chemical profession, will continue to serve the Society, having recently been elected to the board of directors for 1946.

A former chief chemist of the United States Bureau of Mines, and an international figure in the world of science, Dr. Parsons has played a leading role in the development of the 69-yr-old Society into the largest professional organization of scientists in the world, with a membership of more than 43,000 chemists and chemical engineers and with 107 Local Sections functioning in all parts of the country.

This •• or THIS

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Rehandling is easy when THE CLARK METHOD is used—THINK IT OVER.

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When it's Too HOT...Too HEAVY..

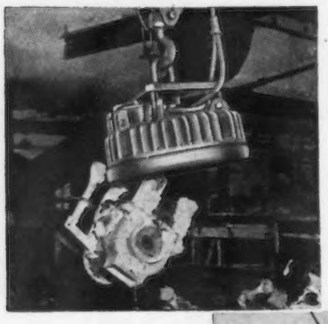
Too SLOW by Hand

an EC&M Magnet gives a LIFT wherever needed

TO CIRCULAR SIZES • A MAGNET FOR *EVERY* CRANE

29-inch diameter Magnet receives 36-volt power directly from crane-truck.

Handling hot casting as soon as edges cool to become magnetic.



25-inch Magnet lifts heavy die-blanks on and off surface grinder.

29R size lifts 1200-lb. pierced armour plate on edge.

THESE are small magnets of 29-inch diameter and less, which are designed to do the odd jobs throughout industry. They handle hot castings from the shake-out floor and lift heavy material from floor to machine. Because of their low cost and medium weight, they can be effectively used on industrial crane-trucks to reach into corners, between machines, through narrow aisles—to cover the territory inaccessible to overhead cranes. New Bulletin 904 describes and illustrates these magnets at work. Write for your copy.

THE ELECTRIC CONTROLLER & MFG. CO.
2698 EAST 79th STREET • CLEVELAND 4, OHIO

Westinghouse Tests Ultra High Voltage Power Transmission

Pittsburgh

• • • **Plans for a** full-scale test to determine the feasibility of transmitting electric power longer distances at greater voltages than ever attempted before were announced recently by the American Gas & Electric Service Corp., and the Westinghouse Electric Corp., the chief producers of equipment for the project.

Two transmission lines, each a mile and a half long and capable of carrying up to 500,000 v—nearly 75 pct more than any existing line—will be constructed along the Ohio River, near Brilliant, Ohio, eight miles below Steubenville. Tests are expected to get underway on these lines by early summer.

A 287,000-v line, the highest voltage line in existence in the country, can transmit power approximately 250 miles. Determination of the transmission range of lines carrying up to 500,000 v and the costs of such transmission are major objectives of this test.

"The need for larger blocks of power to produce goods for the rehabilitation of the world already is being felt," declared Philip Sporn, executive vice-president of AG&E. "In these tests we hope to solve many problems attendant to transmitting power longer distances from areas where production of that power is the most economical."

These problems, Mr. Sporn said, include the seepage of power caused by the ionization and consequent breakdown of the air as an insulator adjacent to a wire or cable; effect of lightning on ultra-high-voltage lines; radio interference and insulation coordination at high voltages. In addition, studies will be made of the margins now believed necessary in selection of conductor diameter, spacing, insulation levels of line and terminal apparatus.

"These studies should provide authentic data and information to permit balancing the factors that influence high-voltage transmission and to find the basis for economical design for transmission of

larger blocks of power," Mr. Sporn continued.

The major portion of the high-voltage operational equipment for the two revolutionary test lines now is under construction in plants of the Westinghouse Electric Corp. At the Westinghouse transformer div. in Sharon, Pa., three single-phase high-voltage transformers, each of which will be 37 ft high when completed, are being built. They have extra heavy insulation to withstand the as-yet-untried transmission voltages.

These transformers will be connected with the turbo-generators of the AG&E, Ohio Power Co.'s plant at Brilliant and will step up the voltage to be thrown on the test lines to as much as 500,000. Tests will be made in the entire voltage range from 264,000 to 500,000.

At the East Pittsburgh Works of Westinghouse, huge lightning arresters and intricate metering equipment for the high voltage lines are under construction. The lightning arresters also will tower approximately 37 ft above the ground and have special grading rings to equalize the voltage stresses along the lengthy "chains" of insulators. The metering equipment will be used to measure the line voltages and corona power loss and is expected to be the most accurate equipment of its kind ever developed. It will be able to pass large currents but measure low power.

Other companies supplying materials and equipment include the American Bridge Co., which is constructing special-type transmission towers; the Aluminum Co. of America, Anaconda Wire & Cable Co., General Cable Corp., and the Phelps Dodge Copper Products Corp., which will furnish transmission line conductors of various types and sizes; the General Electric Co., which will supply switching equipment, arresters, current transformers and potential devices for later use, and the Ohio Brass Co. and Locke Insulator Corp. which will furnish insulators and hardware.

In addition to the Ohio Power Co. two other principal companies of the AG&E central system, the Appalachian Electric Power Co. and the Indiana & Michigan Electric Co., and the other smaller operating companies in the central

S-T-R-E-T-C-H-I-N-G A BOXCAR

IN THE EARLY STAGES OF THE WAR, a serious shortage of shipping space threatened supply lines to Europe and the Pacific. Aiding in the urgent search for a solution to the problem, The Cambridge Tile Manufacturing Company, Cincinnati, successfully completed an experiment in compressing three carloads of dried whole egg powder and loading them into a single boxcar.

Presses that had been used to compress clay into Suntile were quickly converted into food-compression equipment through the use of new dies designed and built in Cambridge Tile's own shops. Facilities were rapidly expanded to meet the ever increasing demand of the Armed Service Forces for compressed emergency rations. But the conversion created handling problems that throttled production and prevented full utilization of the extra shipping space made available by the new food compression method.

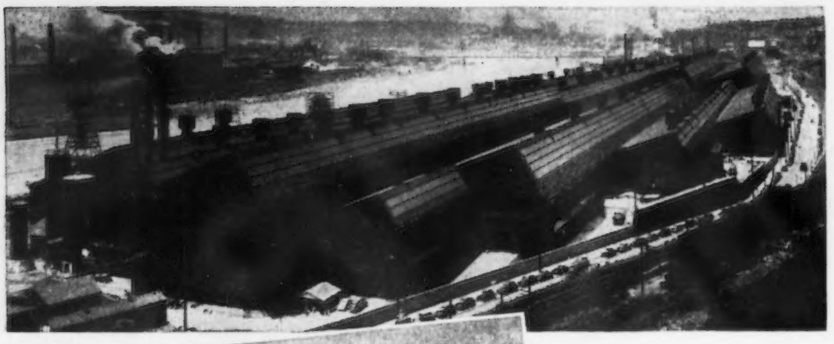
So Towmotor engineers were called in to install a modern materials handling system. 100-pound bags of dried food powders were loaded on pallets in the receiving room and fed to the production line in a continuous, controlled stream. The finished cakes of compressed food were packed into shipping cartons, assembled into large unit loads, and moved directly into the boxcars by one girl and a Towmotor. Work schedules were accurately timed to provide maximum output per man and machine. Closer inventory control eliminated delays and tie-ups. Production speed was increased to machine capacity, freed from the limitations imposed by slow handling methods. Most important, Towmotor made possible immediate and full utilization of every foot of shipping space.

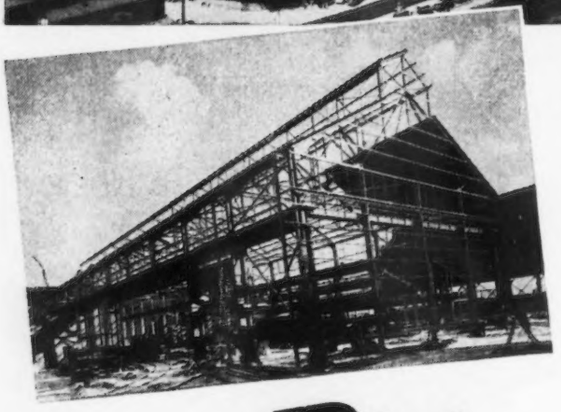
The results achieved at Cambridge Tile are typical of Towmotor installations throughout industry. The know-how and experience that contributed numerous opportunities to increase productive output also enabled Cambridge Tile to effect savings of $1,000 a month in handling costs alone. The Towmotor Materials Handling Analysis Guide, a product of know-how and experience, will greatly simplify your handling problem; send for a copy today. Towmotor Corporation, 1230 East 152nd Street, Cleveland 10, Ohio.

TAKE IT UP WITH

TOWMOTOR

THE ONE-MAN-GANG





↑ Jones & Laughlin Steel Corp., Strip Mill, Pittsburgh, Pennsylvania.

← Great Lakes Steel Corp., No. 3 Slab Yard Building. Ecorse, Detroit, Michigan.

Fort Pitt Bridge...

HEADQUARTERS FOR NEW IDEAS IN INDUSTRIAL CONSTRUCTION

The old, unsightly factory is on the way to oblivion. In its place will be found a planned structure, streamlined in design, completely practical for faster, more economical production. Yes, it will be a structure of beauty, designed to harmonize with surroundings, adding value to the area in which it is built and to the community.

Fort Pitt Bridge has kept abreast with these new trends, cooperating with the architects and engineers. Many of these new ideas are incorporated in the new structural steel buildings for aircraft, chemical, steel, public utilities and other plant construction.

STEEL Permits Streamlining Construction with Safety, Endurance and Economy

FORT PITT BRIDGE WORKS

Member American Institute of Steel Construction

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system will participate in the tests.

Transmission of power at higher voltages than the 287,000 now handled has been theoretically possible for some time. From these tests, AG&E expects to learn definitely if the gain in distance and quality of transmission with the higher voltage lines is sufficient to warrant the cost and maintenance of the transmission equipment necessary for it.

Surplus Tools Offered

Washington

• • • **Exports from the** United Kingdom of government surplus used and unused machine tools which have been on offer to British industry through the Disposal Scheme for a period of four months has been authorized, according to the Department of Commerce.

Foreign sales of surplus machine tools have heretofore been prohibited in order to provide British industry with the first opportunity to acquire the best surplus tools available. The restrictions on the export of American tools acquired under Lend-Lease arrangements remain in force.

Dresser Sales and Net Up

Cleveland

• • • **Dresser Industries, Inc.,** reports estimated net earnings for the fiscal year ended Oct. 31, 1945, of $1,800,000 as compared to $1,656,359 for the previous year, according to quarterly letter to shareholders. Net sales for 1945 are estimated at $81,000,000, compared to $54,995,408 for 1944. Unfilled orders of member companies of Dresser Industries totaled $21,452,000 as of Oct. 31, 1945, compared to $25,000,000 on the same date a year ago.

Additional Controls Out

Washington

• • • **Through revocation** of L-269, CPA has lifted allocation controls on cutting machines, loaders, conveyors, (trucks crawler type), hoists, crushers, grinding machinery, smelting and refining equipment and ore dressing and coal dressing equipment.

Across the Board Hike Made in Pig Tin Quotas During First Quarter

Washington

• • • **CPA has announced** an "across the board" increase in pig tin quotas for the first quarter of 1946 to help industry increase production. This increase, CPA said, can only be made possible by dipping heavily into the government stockpile. The government stockpile subject to allocation at the end of 1945 was approximately 20,000 tons.

The action was accomplished through an amendment to the tin conservation order (M-43) issued Dec. 29. At the same time CPA revoked Directive 4 to M-43 as its provisions are now incorporated in Schedule IV of the order. Consumer goods products benefiting from the increased quotas include collapsible tubes, tin foil, equipment for preparing and handling food and chemicals. Other increased quotas are for tin pipe and sheet, all types of solders, tinplate and terneplate.

In the amended order, there are numerous changes in the base periods that apply to various products. Accordingly all consumers of pig tin are advised to scan the amended order carefully to assure themselves that they are using the correct base period for a particular product.

Principal changes in pig tin quotas for the first quarter of 1946 compared with those applying in the last quarter of 1945 are:

Tinplate and terneplate. Now 100 pct of 1945 quarter against 95 pct of 1944 quarter.

Tinplate and sheet. Now permitted use—130 pct of the amount used in the corresponding quarter of 1945 against 100 pct of amount used in corresponding 1944 quarter.

Cast alloys. Fifty pct of corresponding 1945 quarter against 60 pct of 1944 quarter. (CPA officials expect that this will result in very little change from previous use.)

Brass mill products. Now 100 pct of 1945 quarter against 100 pct of 1944 quarter.

Solders. Increased to 135 pct of corresponding 1944 quarter from former permitted use of 100 pct of that quarter.

Chemicals. Permitted use in-

ON YOUR NEXT "Stainless Job"

FIGURE THE LOWER MATERIAL COST OF INGACLAD STAINLESS-CLAD STEEL
See how you save---

In designing new products . . . new plant equipment . . . or in modernizing your present plant, it will pay you to consider the generous use of Stainless Steel. Now more than ever you can use it freely because IngAclad Stainless-Clad Steel, at much lower cost, gives all the stainless service you will ever need . . . on the side that is used.

Ingersoll Steel Division of Borg-Warner Corporation produces both IngAclad and Ingersoll Solid Stainless Steel. Our engineers are, therefore, in a position to advise you without prejudice. This helpful service is yours without obligation.

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Groen Mfg. Co.
Leader Iron Works
Monsanto Chemical Co.
Procter & Gamble Co.
Sherwin-Williams Co.
Solvay Process Co.
United States Potash Co.
Whiting Corp.
and many others

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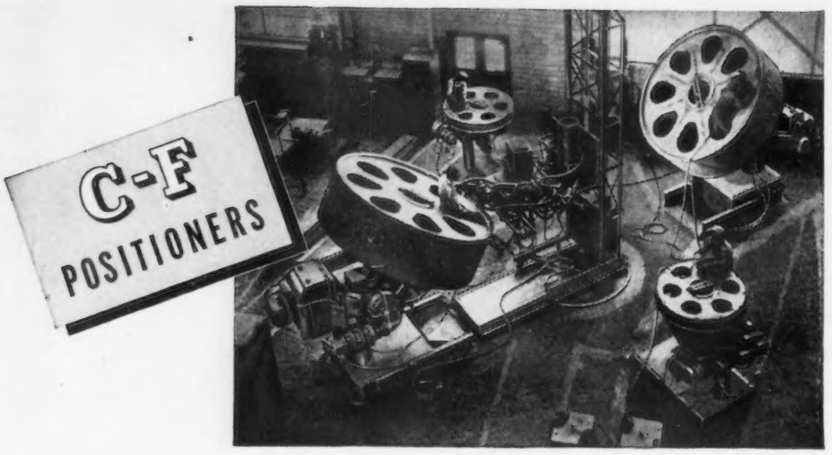

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A "double production line"—in a 30 ft. square space handles all of the progressive steps of building up 2 sizes of large turbine gears simultaneously.

Four C-F Positioners are grouped radially around one automatic welding machine—2 No. 12s (1,200 lb. capacity) in diagonally opposite corners, 2 No. 140s (14,000 lb. capacity) in the other corners. With this arrangement, the single automatic welding machine can serve all 4 positioners and is used for all peripheral welds on the weldments. For this operation, the positioner rotates the tilted weldment under the electrode at any desired speed from 0 r.p.m. up. While the automatic welding machine is busy on one weldment, 3 welders are completing the hand welding operations on the other 3 C-F Positioners, which under push button control, turn and tilt weldment to any desired position permitting all welds to be easily made "down hand."

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SPECIALISTS in SHAPES laminated from resins and fabrics (glass, synthetic or cotton) to exacting needs of America's leading industrial engineers. Tell us your shape requirements. We probably can submit samples similar to your needs. Write to Andover Kent, New Brunswick, N. J. — TODAY!

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UNBREAKABLE • LIGHT • NON-ABSORBENT

creased to 200 pct of corresponding 1945 quarter compared with 100 pct of corresponding 1944 quarter.

Equipment for preparing and handling food. May now use either the permitted use in 1944 quarter or that of the corresponding quarter of 1940, whichever is greater. Former use permitted 1944 quarter base or 15 pct of 1940 quarter.

Collapsible tubes. May now use 125 pct of corresponding quarter of 1944 compared with previous use of 100 pct of that period.

Tin foil. May use 110 pct of 1944 quarter against former permitted use of 80 pct for that period.

Because of the liberalization of the order, appellants from its provisions can expect very few concessions, CPA officials stated.

Freight Car Building Seen at High Levels

New York

• • • **Railroad car building,** both freight and passenger, is expected to reach new highs in 1946 providing car builders are able to obtain the necessary steel. Material used for car building purposes is tighter now than at any time since the war, but it is believed that enough steel will be forthcoming after present labor controversies are settled to enable a consistently high level of car construction.

Among some of the recent railroad purchases are: Twelve 4-8-4 Type fast freight locomotives placed with Baldwin Locomotive Works by Western Maryland Railway Co.; one hundred 50-ton steel sheathed box cars placed with American Car & Foundry Co. by the Pittsburgh and West Virginia Railway Co.; three hundred 50-ton drop end gondola cars and two hundred 50-ton flat cars placed with American Car & Foundry Co. by Elgin, Joliet and Eastern Railway Co. and twenty-five 50-ton sheathed box cars awarded to American Car & Foundry Co. by Delaware & Hudson Railroad Corp.

Pennsylvania Railroad has asked for bids on 214 new passenger cars among which are included 129 sleepers, 21 lounge cars, nine observation cars, eleven 2-unit dining cars, 21 day coaches, 2 day lounge cars and 4 baggage-dormitory cars. Bids were to have been submitted on Jan. 14.

Automotive Engineers Consider Jet Engine Developments to Come

Detroit

• • • **At the 1946 annual** meeting of the Society of Automotive Engineers here, speakers at the aircraft powerplant session reported that considerable research lies ahead of the jet engine development.

William R. Hawthorne, of Ministry of Aircraft Production, London, said that jet engine design permits of analytical calculation to an extent hitherto impracticable, and enables the engineer to predict performance with greater confidence than ever has been possible with reciprocating engines.

"The aircraft engine designer of the future," he added, "will be preoccupied less with problems of mechanical design and more with problems of fluid motion than his predecessor." Mr. Hawthorne explained that each component of the jet engine may be put through separate processes of aerodynamic development on suitable test rigs, permitting the designer to plan various arrangements and to assess their merits.

Great need exists for research, he said, especially in the fields of metallurgy, for the purpose of developing materials highly resistant to creep, fatigue, oxidation, erosion, and extreme stresses and temperatures; in aerodynamics, where knowledge of compressible flow is lacking; in the control of gases moving at high speeds; and in the aerodynamics of combustion.

Opinion was expressed by Frank C. Mock, of Bendix Products Div., Bendix Aviation Corp., South Bend, Ind., that jet engine design should start with the combustion chamber in order to avoid troubles already being experienced in the form of hard starting, excessive temperatures, blow-out, and die-out.

"Most of us," he said, "having had casual experience with combustion all our lives and all the way from bonfires to blowtorches consider ourselves experts, and we tend to think this jet burner art is easy. This subject has not received sufficient attention thus far. Our engines are not aircraft

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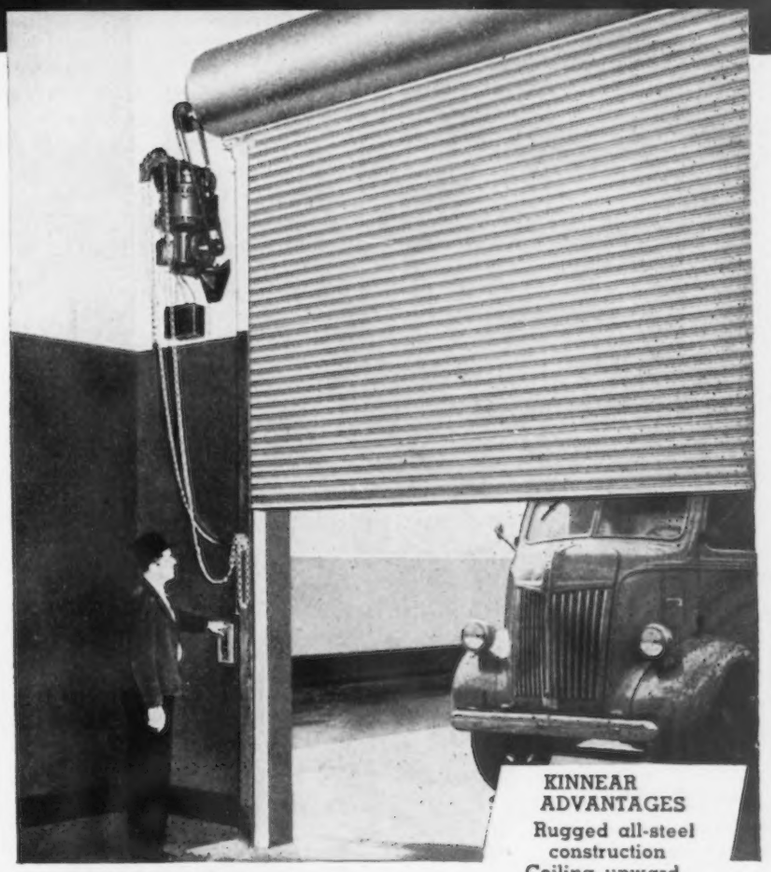

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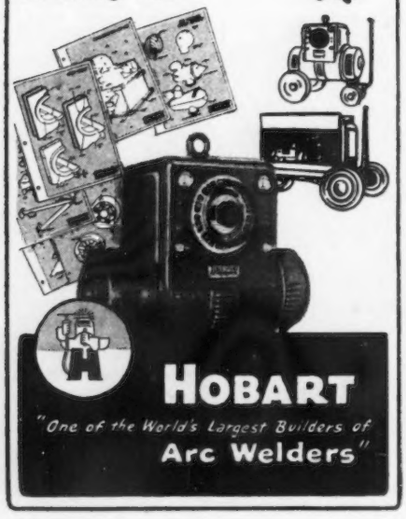

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engines, and our jet aircraft are not military service aircraft, unless combustion is positive and dependable under operating conditions. Therefore, the combustion chamber should be one of the first elements to be experimentally proved before a given engine arrangement is adopted."

Interest in the technical papers was shared with one of the most complete jet engine exhibits ever assembled in this country. It included the German Juno 004, the General Electric I-40, both loaned by Air Technical Service Command, Wright Field, Dayton; and a Heinkel-Hirth HES-SA, a BMW-003A, and a Westinghouse 19-B, loaned by Powerplant Sect., Navy Dept., Bureau of Aeronautics.

Jessop Rebuilds Bar Mills; Adds Strip Mill

Pittsburgh

• • • **Jessop Steel Co.**, Washington, Pa., is preparing for additional equipment to augment present cold strip rolling facilities. A new Sendzimir mill, to be built by Waterbury-Farrel Foundry and Machine Co., Waterbury, Conn., will be installed late this spring. It will be set up in a separate building that will be fully air conditioned. Auxiliary equipment to the Sendzimir cold strip mill will include continuous annealing furnaces and a continuous pickling line. Slitters and other accessories will likewise be required.

As part of Jessop's postwar program, the company's bar mills are undergoing extensive reconstruction, with an eye to increasing their respective capacities. The 12-in. bar mill is being changed over from a two-high to a three-high mill by the installation of five new roll stands.

Six new 3-high roll stands and auxiliary equipment including heating furnaces and larger coilers will double the capacity of the present 10-in. bar mill.

In conjunction with these plans, Jessop is installing annealing capacity, pickling equipment, wire drawing blocks, and other facilities that will permit the company to expand into more fields such as wire, stainless steels in lighter gages and smaller sizes, special shapes, and many items requiring closer tolerances and high quality.

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New Alloys, Techniques Expand Markets For Aluminum After War

New York

• • • **The new high strength** aluminum alloys 75S and R303 introduced during the war for aircraft construction, found wider acceptance in 1945 and will occupy an important position among peacetime alloys.

Alloy 63S, which went into production during the year, is designed particularly for architecture and building applications and is noted for its ability to take a bright, clean anodic coating. The year also marked the commercial introduction of Alclad 14S sheet, combining high yield strength with good resistance to corrosion.

Significant progress was made during the year in the fields of welding, brazing and resin bonding, all of which will affect the fabrication of postwar aluminum products.

Rolling stock was augmented during 1945 by the addition of 32 aluminum tank cars, and 50 more on order. An all-aluminum articulated subway train is being built by the Pullman-Standard Car Mfg. Co. for the Chicago Rapid Transit Co. The Missouri-Pacific has ordered 24 aluminum hopper cars, and experimental aluminum refrigerator cars are under construction.

Aluminum emphasis in the automotive industry is centered at present on light alloy applications in trucks and trailers, particularly the latter. Experiments are under way regarding the use of aluminum axle housings for heavy duty trucks and trailers and savings in weight up to 500 lb per unit are reported.

Major air lines are planning postwar planes capable of carrying 200 passengers or more at cruising speeds far exceeding those of planes in use today. Aircraft manufacturers continue to use aluminum as the principal material not only for large planes, but for small aircraft as well.

Marine engineers report a trend toward use of aluminum in the construction of cargo and passenger vessels. At the present time the Ingalls Shipbuilding Corp. is fabricating aluminum stack houses for three combination passenger and cargo ships for the Mississippi Shipbuilding Co. Two cargo-passenger ships which Bethlehem Steel

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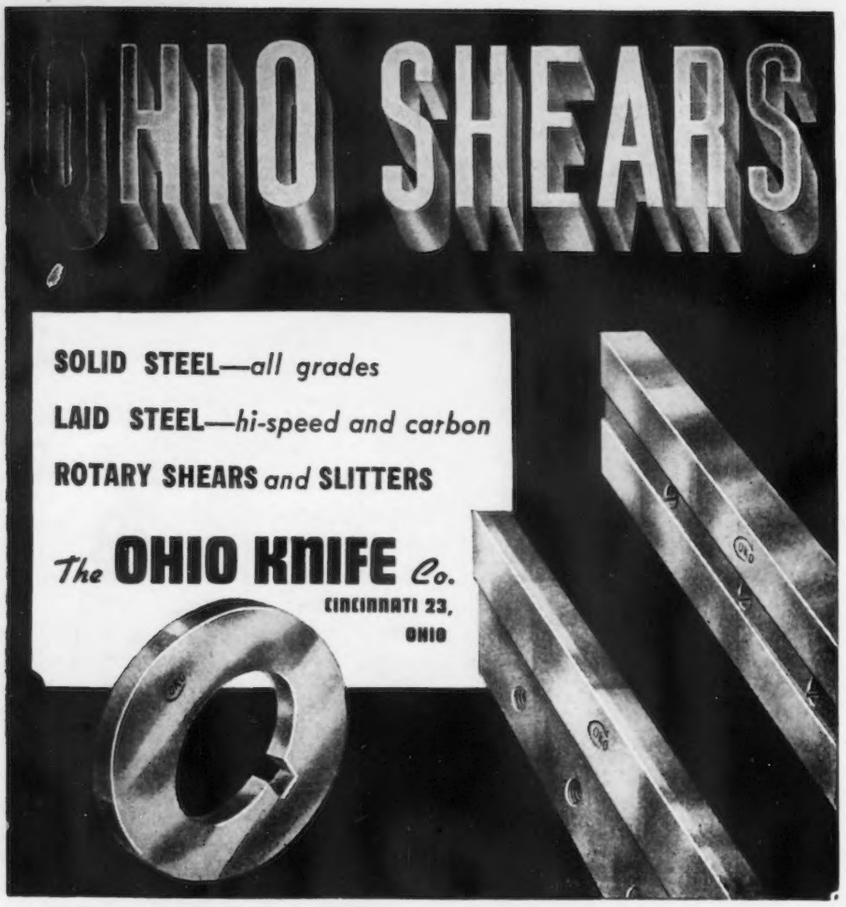

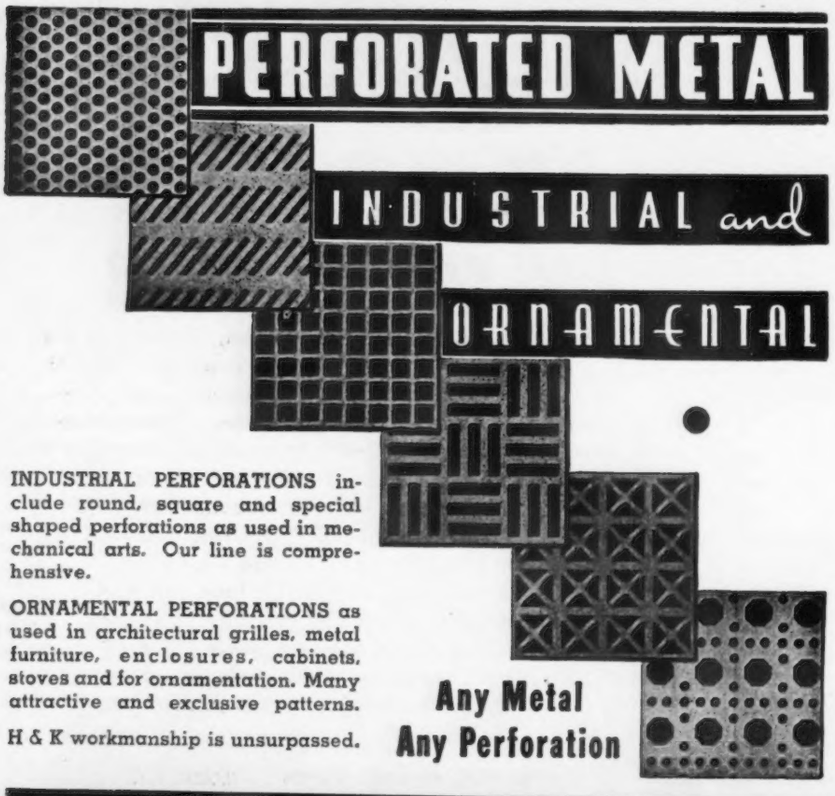
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Co. is building at Alameda, Calif. will have upper decks constructed completely of aluminum—an innovation in marine construction.

Highway departments in a number of states are actively considering the use of aluminum license plates for automobiles. Connecticut has employed such a plate since 1937 with highly satisfactory results. Not only are aluminum plates considerably lighter and cheaper to mail, but over a period of years they are more economical from the viewpoint of maintenance.

Another 1945 development was the aluminum piano plate, a product which represents the culmination of many years of research. The aluminum plate retains the musical virtues of the cast iron plate and weighs considerably less.

During the year an experimental canning program was inaugurated by the Ordnance Dept. in which aluminum plays a prominent role. The program calls for containers made of aluminum sheet to be utilized for the long-time storage of ordnance equipment ranging from small arms to artillery and tanks. Provided the program is carried through to its conclusion, several hundred thousand pounds of aluminum sheet will be needed.

Bridge engineers are watching with interest the construction of a new type bridge over the Grasse River at Massena, N. Y. Unusual feature of the bridge will be a 100-ft. aluminum span which is being fabricated in the shops of the Bethlehem Steel Co.

At Nutley, N. J. a new type of building is being completed for the Federal Telephone and Telegraph Co. The walls of the building are constructed of glass with an outer sheeting of aluminum.

Developments in the field of aluminum finishes continued at a rapid pace. The Alumilite Process has been further perfected and peacetime customers of aluminum will find the metal finished in practically every color of the rainbow. New types of dye colored oxide coatings produced by chemical treatment are promised for such items as hookless fasteners, eyelets and other similar items.

Commercial electroplating of aluminum is available for many types of products. Nickel, copper, silver, chromium and gold platings can now be applied to aluminum, using a zinc immersion procedure. Gold plated aluminum can be used for novelty articles and for jewelry.

Railroads Are Buying 1500 Passenger Cars And 3600 Freight Cars

Washington

• • • **From an operating** standpoint the year 1945 was for the railroads one of unusual difficulties and achievements, according to J. J. Pelley, president of the Assn. of American Railroads. Early in the year the record snow storms in the critical Great Lakes area seriously disrupted traffic movement, but the railroads delivered during that period to the Atlantic ports for shipment to Europe more war supplies than ever before, he said. The sudden ending of the war, first in Europe and then in the Pacific, with its effect upon the nature, direction and flow of railroad traffic, imposed unusually difficult operating problems. Nevertheless, the high efficiency which has characterized railroad operations throughout the war was continued, and in some particulars new high levels were reached, Mr. Pelley said and continued:

"At the opening of the year, the railroads were carrying traffic arising from the nation's maximum war effort. At the close of the year, in bringing home the servicemen from the Pacific and Atlantic ports, they were handling a heavier concentration of military travel than at any time during the war itself. Nevertheless, the decline in the movement of most classes of freight and of general travel after the close of hostilities with Japan, brought the total freight movement for the year down to about 680 billion tons miles, or approximately 8 pct less than in the year 1944, and the total passenger travel down to approximately 91 billion passenger miles, or about 5 pct less than in 1944.

"In the latter months of 1945, the general level of freight traffic was nearly 20 pct below the corresponding period in 1944. Certain commodities, however, notably grain and grain products, are moving in record volume, causing an extraordinarily heavy demand for high type box cars suitable for such loadings.

"The railroads were called upon to handle peaks of travel with

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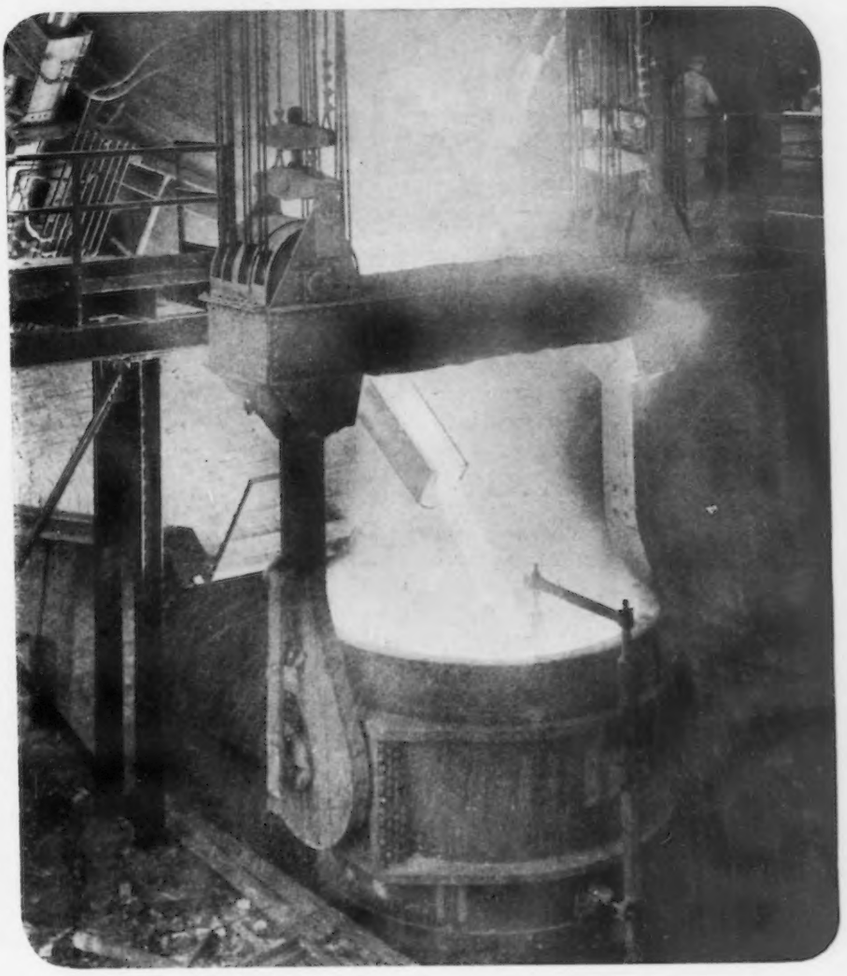

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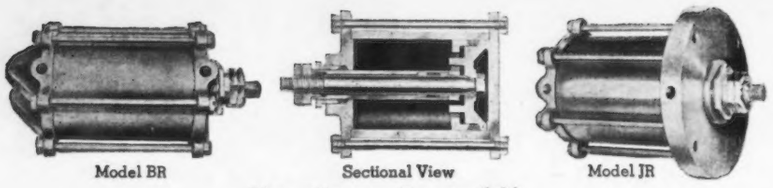
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virtually the same passenger equipment they had at the beginning of the war. Since the close of the war, however, with the relaxation of wartime restrictions upon the securing of new equipment, the railroads have placed orders for approximately 1500 new passenger train cars of the most modern type. Virtually none of these can be delivered before well into 1946.

"New freight cars installed in 1945 amounted to approximately 40,000 which was more than in any year since 1942, before the effect of war restrictions on railroad car building was fully felt. At the end of 1945, 36,000 freight cars were on order.

"During 1945 the Class I railroads spent for fuel, materials and supplies used in current operations approximately the same as the $1,610,529,000 spent in 1944. Capital expenditures for new equipment and improvements in roadway and structures are estimated at $600 million for 1945, as compared with $560,112,000 in the preceding year.

"Railroads have much deferred maintenance work to be done, although they are not under-maintained in the sense that they cannot perform freight and passenger services safely and efficiently. There also is a considerable amount of deferred improvements in roadway and equipment which could not be carried out during the war, but which will now be undertaken to the extent required for better service and more efficient operation in the future.

"From a financial standpoint, net earnings in 1945 were less satisfactory than in any of the three preceding years. The peak in net earnings was reached in 1942, and due to rising operating costs has since been on the decline. Gross revenues in 1945, for example, were nearly $1.5 billion above those of 1942, but net railway operating income was below 1942 by substantially more than $600 million.

"At the close of 1945 the railroads were hauling freight at general rate levels no higher than before the war started, while the average charge for carrying a passenger one mile was only 3 pct higher, and was actually lower than before the first World War. This was true despite increases in

railroad wages in 1941 and again in 1943 which totaled 28 pct, and increases in the price of materials and supplies since Pearl Harbor which averaged about 24 pct.

"This stability in rates in the face of rising wages and price levels was made possible by the combination of a number of factors. There was much better utilization of equipment, heavier loading, more prompt loading and unloading, and a lesser percentage of empty car mileage, largely as a result of the cooperation and teamwork that has existed between the shipping public, the government and the railroads."

Cutting Tool Makers Assn. Elect Officers

Detroit

• • • **E. A. Goddard,** general manager of Goddard and Goddard Co., Detroit, was elected president of the Cutting Tool Manufacturers Assn. at the second annual meeting of the organization recently. He succeeds W. G. Robbins, president, Carboloy Co., Inc.

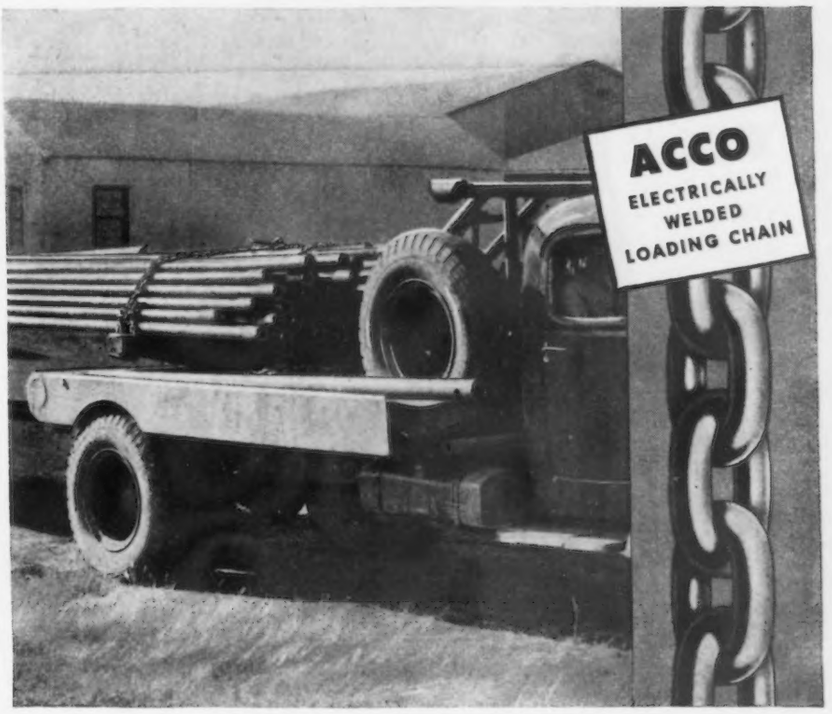
R. G. Michell, president of Eclipse Counterbore Co., was elected vice-president. R. H. Wolfe, president of Arrow Tool and Reamer Co. was reelected treasurer, while Harry J. Merrick continues as its executive secretary.

Elected as new directors to serve for three yr. were L. C. Gorham, president of Gorham Tool Co., Detroit; E. C. Putnam, president, Putnam Tool Co., Detroit; E. F. Reinhart, president, Republic Drill and Tool Co., Chicago, and R. H. Wolfe.

The speaker at the evening session of the association, attended by some 250 representatives of cutting tool manufacturers and their guests, was Dr. Claude Robinson of the Opinion Research Corp. He criticized industry for having failed to do a sound job of public relations, particularly in connection with questions dealing with labor.

In this connection, Mr. Merrick had reported to the meeting earlier in the day that a study of wage rates in Detroit industry had revealed that the rise in wages in cutting tool plants during the war years had been considerably in excess of that for other industries.

THE TOUGHER THE JOB THE MORE REASON TO "BUY AMERICAN"



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Survey Finds Company Reports Inadequate

Pittsburgh

• • • **Security analysts** consider corporation reports to stockholders "generally inadequate" and must resort to "digging up their own supplementary information" to be able to appraise relative merits of securities, they indicated in a survey recently.

A total of 123 professional judges of securities—security analysts of various types of investment institutions, officials of banks and insurance companies, and brokerage firms over the United States—replied to the survey undertaken among several hundred investment specialists by M. K. Mellott & Co., Pittsburgh, which sought to determine non-company views on the extent of progress in corporate reporting during the past few years.

In only two cases were the analysts "fully satisfied" with corporation reports, although 47 conceded "some degree of adequacy" in company statements. All of those who replied said company reports represented their first source of information, but there was heavy reliance on statistical services and the newspapers.

One of the surprises of the survey was the large number reporting personal contact with company officers for information which also was obtained from company customers, the SEC, banks, credit agencies, brokers, and a host of other sources of varying degrees of reliability.

This indicates, the Mellott firm said, that corporations cannot really conceal their activities from an investigator intent upon finding the facts.

The firm also found that company reports were often criticized as obscure, infrequent, incomplete, late, often devoid of sales and other pertinent figures, lacking in clarity, as well as biased; accounting practices varied so considerably that correct interpretations of a company's position were hard to deduce, even by those familiar with accounting terminology; and not enough was being disclosed on "policy".

The survey disclosed that investment analysts feel that corporate reporting is deficient in dis-

cussing costs, depreciation policy, reserves, competition, merchandising policy and management. Inadequacy of information on costs was stressed, and typical comments on this subject were that too much is bulked under general and administrative expenses while detail is lacking on selling expenses, administrative expense, wages, salaries, raw materials and supplies.

Some Open Head Steel Drum Ceilings Advanced

Washington

• • • **Upward adjustment** in ceiling prices for two sizes of open head steel drums, production of which was sharply curtailed during the war, have been announced by OPA. The higher prices became effective Jan. 2.

The adjustments are designed to encourage production of these two sizes of drums and to alleviate the necessity for users to resort to higher priced shipping containers made of wood. The higher ceiling prices will permit manufacturers to recover total costs on the drums, OPA said.

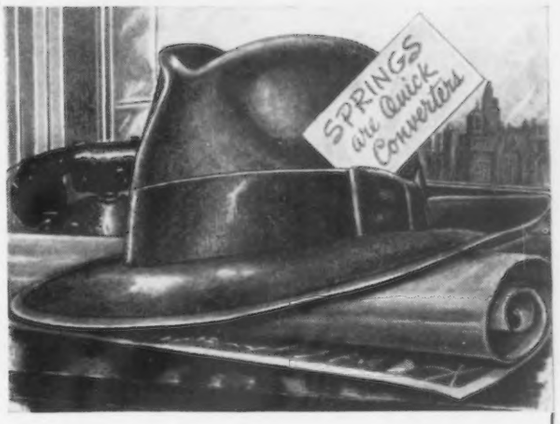
The two drums for which price adjustments are being made are the 55-gal open head steel container, used for packing and shipping greases, hard oils and chemicals, and the 58-gal size with sanitary baked enamel lining, used for shipping lard, vegetable fats and other shortenings.

The new manufacturers' ceiling price for the 55-gal open head drum is their March 1942 price plus 24¢ per drum, and for the 58-gal enamel-lined drum their March 1942 price plus 33¢ per drum. Increases will be absorbed by industrial users of the drums, OPA said.

The 24¢ increase represents a rise of 8.4 pct over the ceiling price for the industry in March 1942 on the 55-gal drum, and the 33¢ increase for the 58-gal enamel-lined drum is a rise of 11.2 pct over the old ceiling price.

The 55-gal drum prior to the adjustment was being produced on an industry-wide basis at an average loss per container of 24¢, according to OPA, and the 58-gal enamel-lined drum was being produced at an average loss of 33¢.

A Memo for the Plans you've been keeping under your Hat



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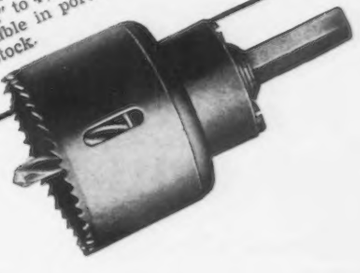
Heavy feed at high speed spells doom to the ordinary hack saw blade; down-time for your machine, extra expense in money, man hours, and production. The MARVEL Hack Saw Blade, because it is positively *unbreakable* under these conditions, should be "a must" tool in every efficiently operated shop. A tough alloy steel back is electrically welded to high speed steel teeth, producing a blade that can be pulled to almost unlimited tension; can withstand extra heavy feeds and the heat and abrasion of high speed heavy duty sawing.

Heavy feed at high speed!

The same exclusive *unbreakable* feature of MARVEL Hack Saw Blades is also a feature of MARVEL Hole Saws, giving these saws the ability to stand up under abuse. MARVEL Hole Saws cut holes from ⅝" to 4½" diameter in stock up to 1⅛" thick. Usable in portable drill, drill press, or lathe tail stock.



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Complete Range of Metal Sawing Machines
Being the largest exclusive manufacturer of metal sawing machines and blades, both hack saw and band saw type, we have the correct answer to your cut-off problems. Each MARVEL model has a distinct application, so write us and we will send our catalog, price, and recommendation for the saw to fill your requirements most efficiently. MARVEL sawing engineers are also available to discuss and analyze your cut-off work. (Without obligation of course)

ARMSTRONG-BLUM MFG. CO.
5700 Bloomingdale Ave., Chicago 39, Illinois, U.S.A.

ARE YOU CAUGHT BETWEEN RISING COSTS AND A FIXED PRICE

This New Hydraulically Cushioned, Power Feed Can Help You

CONVERTS HAND-FED DRILL PRESSES, TAPPERS, MILLERS, GRINDERS, ETC., TO FAST AUTOMATIC UNITS, QUICKLY AND INEXPENSIVELY – FREQUENTLY ENABLING ONE OPERATOR TO RUN TWO OR MORE MACHINES . .

THE NEW Bellows-Senacon Model DF Feed is an improved version of the Model BF Feed which broke one production bottleneck after another in more than 1500 key war plants. Production increases ranging from 40% to 500% were the normal experiences of plants installing Bellows-Senacon Feeds. Longer tool life, fewer rejects, less worker fatigue, and fewer accidents were results almost universally obtained.

Bellows-Senacon Controlled-Air Power Feeds may be used on almost any machine tool. At a touch of the operating handle they will advance spindles, spindle heads, work tables or other machine elements, a predetermined distance, at a predetermined rate and power thrust, and automatically return to starting position and stop. Simple and easily accessible controls permit accurate regulation of air pressure, feed and traverse rates, and stroke length. The Bellows-Senacon Hydro-Check* — a hydraulic resistance unit — eliminates the natural "bounce" of air, assures utmost smoothness of feed. The Hydro-Check may be used to check the feed in drilling at the "break through," to check the feed just before the drill enters the work, or to provide more perfect control of the cutting operation during the entire feeding stroke.

1. Metal cover fully encloses working parts, protecting them from dirt and chips.
2. Stroke is adjustable from ½ inch up to maximum stroke of motor. Model DF-60 is powered with a 6" stroke Air Motor, Model DF-90 with a 9" stroke.
3. Vernier control is provided for accurate adjustment of stroke length.
4. Forged steel Air Motor heads: for maximum strength.
5. Finest Air Motor Construction — heavy tie rods, heavy brass cylinder, non-ferrous alloy piston rod guide and special synthetic piston cups.
6. Direct connected directional air-valve is quick and positive.
7. Rate of traverse in either or both directions is controlled by two adjustable speed control valves.
8. Operating lever is positioned for maximum comfort, minimum fatigue.
9. Positive safety control permits instant release and automatic retraction of the feed.

Controlled STROKE LENGTH · TRAVERSE RATE ·